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*Illustrated.

The Copper Statistics for February

The increase in the accumulation in February was not unexpected among the well informed, nor under the conditions is the showing unfavorable. The January statistics looked much better than they were; the reverse is the case with respect to the February figures. During January, domestic manufacturers accepted delivery of a good deal more copper than they used, and at the very end of the month, a large quantity was despatched from the refineries for export, delivery being hastened for reasons that it is unnecessary to go into. If these shipments had been delayed a day or two, January would have showed a smaller decrease in the accumulation, and February would have shown a decrease instead of an increase.

The most surprising feature of the February statistics is the continued large production, which averaged 4,025,000 lb. per day, against 3,760,000 lb. in January. This shows that the decrease in January was due only to refinery troubles, as we pointed out at the time, which were corrected in February; and that the decreased production of blister copper had not materially affected the refiners up to the end of February. It may be expected to show in the figures for March.

The deliveries for export are likely to run small for several months to come. We have been for a long time transferring a large part of the accumulation to Europe, and of course we are bound to wait for its absorption from there. Consequently, it is the total visible stock that should receive attention, rather than that existing upon this side alone. The total visible supply at the end of February was 361,338,392 lb., which was an increase of about 15,000,000 lb. for the month, but a decrease of about 24,000,000 since Jan. 1, and about 28,000,000 since Dec. 1. The fact that the visible supply of Europe increased only 6,000,000 lb. in February in the face of the large arrivals from this side, is encouraging. Equally encouraging is the large amount of copper taken in February by domestic manufacturers. Deliveries are not the same thing as consumption, but the indications seem to be that the actual consumption in this country is now going on at the rate of nearly 2,400,000 lb. per day, with an increasing tendency.

The Utah-Nevada Contest

The end of the Utah-Nevada contest may be considered a drawn battle, in which the Utah Copper Company obtains the material advantage, while the opposition wins a moral victory. About 950,000 shares of Nevada Consolidated were deposited for exchange for Utah shares. This is 50,000 shares less than one-half of the Nevada capitalization, but the possession of so large a block by a single owner practically insures control. Indeed, a considerably smaller holding would undoubtedly accomplish that purpose. On the other hand, a great majority of the Nevada stockholders, who numbered about 6000, refused to deposit their stock. Nevada Consolidated will now bear substantially the same relation to Utah Copper Company as Anaconda has borne with respect to Amalgamated.

In their statement that exchange of 2¼ shares of Nevada for one share of Utah was an equitable basis, we know that the Guggenheim engineers were absolutely sincere. Independent engineers

believed that a ratio of two to one was more nearly correct, and we have held that opinion. However, it is to be recognized that the variation in these estimates has been simply a straightforward difference in opinion.

The weakness in the Guggenheim argument was the failure to state frankly all the reasons inspiring the idea of this consolidation. If one of them were to consummate a union in preparation for an attempt at a larger one, the result has been failure, because more than 50 per cent. of the Nevada stock must be reckoned with just as before. If one of them were to obtain the advantage of the wide distribution of Nevada stock, the result has also been failure, because numerically the great majority of the 6000 did not deposit. If the idea were inspired by the fear that control of Nevada might some day turn up in the hands of a rival interest, that danger has probably been forever forestalled. The outside stockholders of Nevada are as well off now as they were before. As Utah Copper Company draws its dividends so will all of the others *pro rata*. The management of Nevada remains unchanged. The Utah Copper Company will benefit from its dividends on Nevada stock, which probably will be helpful during the period when some readjustments in its own operations are being made. The outcome is not of a nature to perpetuate hard feelings on either side.

Canadian Mineral Production

The mineral production of Canada, the details of which are given elsewhere, reached in 1909 a total estimated value of $90,415,763, or nearly nine times the total of 1886, when the present system of reports by the Mines Department of the Dominion was begun. From that year the total gradually, but slowly, increased, until it reached $28,485,023 in 1897. In the years 1898-1900 there was a rapid advance, resulting from the gold production in the Yukon. As the first rush of the placer gold mining there passed, there was a gradual decline until 1904, when the Cobalt mines began to contribute to what has since been a rapid gain.

The mineral industry of Canada is now on a substantial basis, and further gains may be expected from the opening of the north country, which has so far given some surprising and unexpected results. Apart from these possibilities, there is a steady increase in iron ore, nickel and other metallic products, and in asbestos, of which Canada now produces the greater part of the world's supply.

The Western Coal Situation

The Cincinnati conference of bituminous coal miners and operators reached no result beyond the appointment of a joint scale committee, to which the demands of both parties were referred. This committee, however, failed to reach any agreement, and the conference broke up without result. It is uncertain whether another meeting will be called, and the present outlook is that April 1 will see a general suspension of mining. The only result of the conference is that the Illinois question has been eliminated, the miners and operators of that State being left to work out their own scales by consent of both parties. The conference served also to define clearly the position of both parties.

The miners on their side, demand an advance of 10c. per ton on the present rates for pick mining; payment on the basis of run-of-mine instead of screened coal; and a half-day suspension on Saturdays. The operators insist that no advance can be made under present conditions; that no change can be made in the payment basis, which would amount to a further increase; and they insist that the union shrould make good its promise, given several years ago, to organize the States of West Virginia and Kentucky. Their position is that it is very difficult for them now to compete with the two non-union States, which generally pay less than the union rates; with an increase of practically 15 per cent. in the wage rate they would be compelled to give up the fight, and to see business from the large consuming centers go past them to the two non-union States. Already they have lost much trade, and cannot stand it, if they are compelled to work along with only the trade which their rivals cannot supply.

During the last two months most mines have been active and large stocks are being accumulated there and in consumers' yards. It is quite possible that many operators would not object to a stoppage for a few weeks, which would enable them to clear out their stocks at the advanced prices which would certainly follow a strike.

There is no form of mining that is more honorable than the development of a prospect. There is, moreover, no form of mining that is more attractive, because of the large percentage of returns that may be realized. The promoters of a prospecting venture are thoroughly justified in asking the public to supply money in consideration of an interest; but the money thus obtained should be applied to the development of the property. It is not honorable to represent as a mine what is merely a prospect; nor to exploit a prospect to pass on to the public vendors' shares at prices made by the vendors themselves. No experienced mining house would think for a minute of taking over a prospect under such conditions. To the investor, or rather speculator, we say: Do not shun a prospect; but do not mistake a prospect for a mine; and do not put any money into a prospect that you cannot afford to lose.

The fatality rate in both coal and metal mining in the United States is disgracefully high, and measures for the improvement of conditions are worthy of all the attention that they are now receiving; but the people of the United States can correct the evil whenever they want to. The essential measures are adequate inspection and severe enforcement of the laws. The people can have these whenever the majority make up their minds that they want them. Unless they do that, no amount of scientific investigation will be of much service. The prevention of mine accidents is distinctly a matter for the policeman rather than for the scientist.

It begins to be clear that there was not in January and February any real recession in business in this country, as was feared when the prices for stocks were tumbling down in Wall Street. Insofar as the metals are concerned, there was undoubtedly a check to *buying*, because of the large supply that manufacturers had previously secured, but we do not believe that there was any diminution in the rate of *using*.

CORRESPONDENCE AND DISCUSSION

VIEWS, SUGGESTIONS AND THE EXPERIENCES OF READERS

Respecting Press Agents

In reference to the press-agent business, nearly all the big firms and promotion companies maintain relations with some newspaper man, either paying him a salary or giving him a call on a large block of stock for his services. Sometimes this connection is open and above board, and again it is secret, at least as far as the general public is concerned.

Col. William Greene, of Cananea and Gold-Silver fame, employed an industrial agent whose business was to look out for the newspapers, and this agent openly paid to all of the correspondents sending news from the southwest territory a *pro rata* per column for all items relating to Colonel Greene or his properties, no matter whether they were merely descriptive or not. Presumably the items would be at least favorable or non-committal as to the Colonel's operations, but at any rate the correspondents, local reporters and others were enabled to cash in at a fair figure their "strings" on any "dope" relating to Colonel Greene or his enterprises.

The duties of the press agent in some cases are entirely legitimate, for the handling of technical mining news is quite beyond the skill of the ordinary lay reporter and the egregious errors which creep into the daily press from time to time are strongly in evidence showing the inability of the otherwise alert and able newspaper man to handle correctly the difficult technical news relating to the mines. The reporters who are sent to interview mining men and others connected with the mining field often show lamentable ignorance about matters of which they must surely have knowledge before they can intelligently undertake to write up the items covered in their assignments. Frequently they have no general data on which to judge the relative importance of the item given, and they have absolutely no knowledge, geographical, technical or otherwise, concerning the subject, and are entirely at the mercy of the fairness and skill of the interviewed. The omnipotent and omnipresent city editor is supposed to know about these things, but it is clearly evident from the items which are fed to the daily reading public that the city editor's omniscience does not extend to the mining field.

In most of the active mining camps in the West are chambers of commerce and news bureaus, which are skilfully handled and which send out some interesting and generally reliable news concerning the district. However, these so-called news organizations are frequently warped in favor of some particular property, either by reason of financial or personal interest, and the papers generally are unable to discriminate in regard to such news. As a result, more or less "tainted" news is sent out from the camps to the papers throughout the country which publish general mining news and matters of interest relating to mining.

CRITICAL.

New York, March 10, 1909.

Coiling Cables for Alternating Currents on Drums

The article on "Taking up Slack on an Alternating-current Cable," in the JOURNAL, Jan. 1, 1910, is of considerable importance, but to my mind the remedy for the troubles mentioned there is a very simple one. Induction troubles are always met where alternating currents are employed, if there is iron in the neighborhood of the cable. The methods of overcoming the difficulty are well understood, and easily applied. The troubles arise from the fact that alternating currents are rising and falling and reversing, about 3000 times per minute, and each change of strength and direction of the current gives rise to a change in the magnetic field surrounding the cable. If a cable carrying a single alternating current, for instance, is inclosed in an iron pipe, an enormous amount of energy is swallowed up by the pipe, partly as induced currents in the pipe, and partly in the form of changes of magnetization of the iron. It is reported that in the early days of street lighting, when single-phase alternating curents were employed, the single-phase cables in a certain city in the United Kingdom were separately inclosed in iron pipes, and something like half the pressure was lost in a comparatively short distance.

The same trouble would arise in mining work, with three-phase currents, if each cable is armored, or inclosed in a separate iron pipe. In practice, however, no trouble arises, because the three cables are usually laid up together, spirally, and any armor that may be required placed outside of the completed three-core cable, as it is called. This arrangement completely neutralizes the induction troubles with three-phase apparatus for this reason:

There is a peculiar feature about three-phase currents. The sum of the currents or pressures at any instant is zero. Consequently when the three cables are laid up in the manner described, the sum of their action upon the iron outside is also zero. Consequently it appears to me that if a three-core cable is employed for delivering current to a three-phase motor driving a sinking pump, there should be no difficulty whatever, whether it is coiled upon an iron drum or a wooden one. The connections to the ends of the cable can be made either by bringing out the ends of the triple core to slip rings on the axle or by having three-plug terminals, which can easily be disconnected when the cables are to be lengthened. It appears to me also, that the loss of pressure that is described in the article quoted above would disappear for the reasons given.

SYDNEY F. WALKER.

Bath, England, Jan. 29, 1910.

Stamp Drop Sequence

Mark R. Lamb, in the JOURNAL, Feb. 12, 1910, instead of offering any criticism on my remark on the subject of secondary stamp drop, attempts to ridicule it by saying, "Would it not be equally logical to evolve a tertiary drop by omitting two stamps, or a quaternary by omitting three?" We might go still further and evolve another by taking every fifth and getting a series of one stamp only, but it would not be equally logical for the plain reason that the oftener any given sequence occurs the greater is its effect on the feed distribution, which is the point under consideration.

The principal element is the effect of the primary drop, which is modified by the effect of the secondary drop, which in turn is modified, if Mr. Lamb likes, by the effect of the tertiary drop (though not necessarily to the extent of 66 per cent. as he assumes). The final force remaining operative is the effect of the primary drop plus the unneutralized effect of the secondary, and it is therefore quite unnecessary to follow the matter any further back.

Examination of the drop 1, 3, 5, 2, 4, by itself does not show any reason why it should exhibit any tendency to transfer the feed to one end of the mortar, for this arrangement is specially de-

signed to distribute the drop of the stamps as uniformly as possible, but that it has such a tendency is beyond question. Suppose a battery were arranged with the sequence 1, 2, 3, 4, 5, what would be the effect? Everyone will admit that it would be to hurl everything in the mortar violently toward No. 5, and when we find that in the arrangement under consideration we have just such a sequence once in every ten drops, is not the inference obvious that this is the cause of the observed effect?

In case it should be said that any effect of this secondary sequence must be altogether broken up and destroyed by the more frequently recurring primary drop, I will again call attention to the fact that in it there is an uninterrupted sequence of 3, 2, 1, in which Nos. 4 and 5 are the intermediate drops of the primary sequence, and therefore do not interfere with its effect in transferring the feed toward No. 1.

Anyone who dissents from this proposition may reasonably be asked, whether he denies the facts, or cannot see that the inference is consequential, or if he has a better explanation. If the latter, let him produce it; if he cannot see that the inference is consequential, he must be dull indeed, and if he denies the facts he must be ignorant of them.

RALSTON BELL.

Edinburgh, Scotland, Feb. 21, 1910.

Rail Production in 1909

The editorial on rail production in 1909, in the JOURNAL, March 5, 1910, contains one or two statements not strictly accurate. It is true there has been a substitution of open-hearth furnaces for bessemer converters by the Carnegie Steel Company, but this did not affect its rail production. At Duquesne the Bessemer department was discontinued about September, 1907, additional open-hearth furnaces being built, but Duquesne does not make rails. Then at the Ohio works, Youngstown, open-hearth furnaces were added, but the Ohio works has not, I think, made any rails since the first half of 1907. Its rail department took care of overflow work for the Carnegie Company, when the Edgar Thomson plant was insufficient, and Edgar Thomson remains strictly a bessemer operation. I do not think the Carnegie Steel Company has made any open-hearth rails at all to date. Then as to the Maryland steel works, the first of the open-hearth furnaces has been started only within a week or ten days. Gary and Bethlehem, which you mention, I think are responsible for practically all the increase in open-hearth rails in 1909.

The Edgar Thomson plant, which can make over a million tons of rails (bessemer) a year, and can make nothing else, has not averaged one-third capacity in 2½ years, and is not doing better than that now. An enormous depreciation has been written by the decrease in demand for rails, and the preference for open-hearth. Wall Street will take much interest in this fact after the stock-market declines. The newspapers have it that early this week a delegation of Braddock business men called on President Dinkey, of the Carnegie Steel Company, to ask whether the Edgar Thomson plant was really on the down grade, and would never again operate at full capacity. The story, presumably authentic, is that Mr. Dinkey informed the business men that the company intended to erect a splice-bar mill as an adjunct to the Edgar Thomson plant, to cost $300,000 to $400,000. The proposition to make splice bars because the demand for rails is insufficient is not, you will observe, without its humorous aspect.

B. E. V. LUTY.

Pittsburg, Penn., March 5, 1910.

Electrical Precipitation from Cyanide Solutions

This proposal to use electrical precipitation in cyanide plants is concomitant with the increase in metallic contents of solutions used in cyaniding silver ore. The use of air agitation and vacuum filtration greatly reduces the quantity of solution requiring precipitation. This reduced volume of solution is proportionally stronger, or contains more of the cyanides of the precious metals, and this offers a better set of conditions for electrical precipitation than the solutions heretofore used.

The principal disadvantage of exclusively electrical precipitation, which has hitherto prevented its general introduction, is the large and expensive plant required, as compared with a zinc precipitation plant. The disadvantage in the use of zinc for similarly exhaustive precipitation lies in the excessive cost of zinc.

The usual practice, where simple electrical precipitation can be used to advantage, is to use lead or iron anodes and lead or iron cathodes. The current density required varies from a minimum of 0.02 to 0.5 ampere per square foot of cathode. It is necessary to provide from 700 to 1800 sq.ft. of cathode area per ton of solution precipitated per hour. (These large differences are due to the great variations in the weights of metals in the solutions, and to the percentage of precipitation desired.) The richest solutions so treated, of which I have knowledge, contain a maximum of 4 oz. of metal (silver) per ton.

Where zinc is used as a precipitant, the least amount required so far as I know, is one of zinc to one of silver, and from that up to 40:1 of gold, by weight. Even the lesser quantity in a plant treating silver ore alone is a substantial item. In the case of zinc precipitation the principal item of expense is the cost of the zinc consumed. The attendant labor is also a large item. But whereas electro-deposition from a poor solution is relatively expensive, the consumption of zinc varies practically with the amount of metal precipitated, and only varies slightly with the strength of solution.

In the modern closed-circuit plant in which the ore is milled in solution, and in which a minimum of solution is used, complete precipitation from the bulk of solution is not required as it is not necessary to waste any of the solution; also because a small quantity of metal in a solution is of assistance in dissolving further quantities. Complete precipitation is only necessary with the final solution preceding the water wash.

This leads to the suggestion of the following process. All the solution as it comes from ore is passed through electro-deposition boxes in which it is subjected to the disintegrating action of the current, until the solution is so far impoverished that further precipitation would not be economical or desirable. The operator will soon ascertain when this point is reached. Then so much of the solution as it is desired to entirely free from gold and silver is passed through zinc presses and deprived of its metals by reaction with zinc as in the ordinary practice. The zinc-treated part of the solution, after being used as a wash, as well as the other part not so treated, is then returned to the storage tanks, whence it passes through the crushed ore before again reaching the electrolytic vats. In this passage through the ore the zinc content of the solution, which rarely exceeds 0.35 per cent., is precipitated in the crushed ore, thus obviating any serious contamination of the subsequently precipitated precious metals.

In carrying out this process in practice, the anodes should be preferably of carbon, permitting a much greater current density than that at present in use. The cathode can be made of any common metal and of any desired shape, it being merely necessary to provide for the easy removal of the rapidly accumulating spongy deposit of metal. The usual method of handling such a deposit is to wipe it from the cathodes into the hopper bottom of the precipitating box, withdrawing the metal from time to time into a filter press.

Such an auxiliary electrolytic plant to do the majority of the precipitation could be added to an existing zinc room with little difficulty or expense, and could be operated by the same attendant. The power required is nominal; there are no replacements, and skilled attendance is not required. E. F. G.

New York, March 5, 1910.

DETAILS OF PRACTICAL MINING

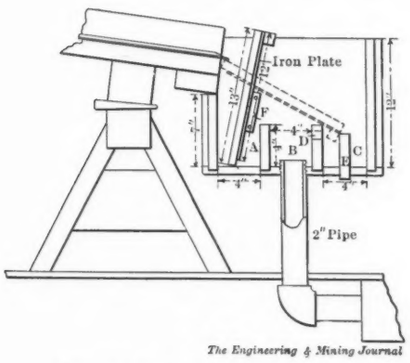
NOTES OF INTEREST TO OPERATORS OF SMALL AS WELL AS LARGE MINES THINGS THAT HAVE TO BE DONE IN EVERY DAY MINING

Readers of the JOURNAL are invited to contribute to this department. Articles should be brief, thoroughly practical, and preferably illustrated by drawings or sketches. Our draftsmen will prepare properly any kind of a pencil sketch that is intelligible. Something that is an old story in one district may be quite unknown in another. Articles accepted and published are suitably paid for.

A Tail Box for Amalgamation Plates

BY H. S. REED, JR.*

In order to shorten the time of dressing plates and to clean down (instead of up), as the most satisfactory method of combating the green spots that appear on the lower ends of the plates, I designed the tail box shown in the accompanying sketch.



CONVENIENT AMALGAM TRAP

It consists of a box made entirely of 1-in. lumber, dressed and well jointed, a trifle longer inside than the outside width of the plate table, and 12 in. deep. It is divided into three compartments, each 4 in. deep by 4 in. wide, and contains a baffle of No. 20 black iron.

The baffle is made by nailing a strip of iron, 12 in. wide, and of such length that the baffle will slip freely into the box without being too loose, to two end strips and one cross piece. These strips are of 1x1-in. wood, the end strips being 13 in. long and the cross piece having the same length as the iron plate. The end strips are fastened to one side of the iron and the cross strip to the other, the iron thus being between the strips where they join at the corners.

While the stamps are dropping, the baffle is in the position shown by the heavy lines, when the compartments *A* and *B*, together with the discharge pipe screwed into and above the bottom act as a trap.

The baffle rests upon the extended ends of the end strips, thus leaving a space at the bottom of the box through which the tailings may flow, and is supported by the cleats *F*, one at each end.

When ready to dress or clean the plates, the baffle is placed as shown by the dotted lines; thus, when the plates are flushed off, the loose particles of amalgam or rich concentrates are caught in compartment *C*, while the water escapes through the hole *D*. The end strips on the baffle coming outside the edges of the plate prevent amalgam or mercury from falling into *A* or *B*. When the plates are dressed an amalgam pail is placed under the box and the plug *E*, which should be long enough to support the baffle, is withdrawn, and the sludge swept from *C* into the pail.

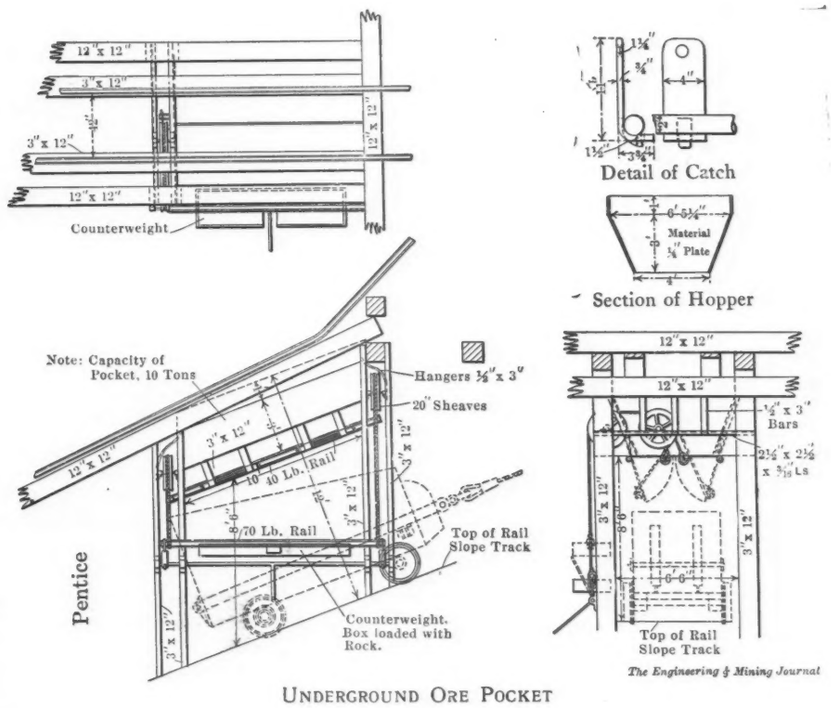
This box is not fastened to the plate table but is supported by blocks, not shown in the illustration, at each end, and is easily removed by having a union in the discharge pipe or a loose board in the floor over the tail-sluice. The elbow should be used, as otherwise there will be constant trouble from splashing and renewing the bottom of the tail sluice.

*Manager, Mina La Gloria, Batopilas, Chihuahua, Mex.

An Underground Ore Pocket

At the iron-ore mines of the Tennessee Coal, Iron and Railroad Company, on Red mountain, Ala., hoisting is done in skips of 10-ton capacity. In sinking slopes without an ore pocket, the skip is lowered until it rests against a pentice of rock, and there receives ore hoisted, by an auxiliary engine from the face of the slope, in 2-ton end-discharge cars dumped by an ordinary curved-rail tipple. These 2-ton cars run over the rock pentice and, when no pocket is used, dump directly into the skip. This necessitates the use of an auxiliary steel car which can be attached to the rear of the skip and pulled out with it, or else the holding of the skip at this point until it can be filled from the small cars.

To eliminate this waste of time, an underground pocket is used in the slopes



UNDERGROUND ORE POCKET

of the Tennessee company, on the Ishkooda and Fossil divisions. The design and method of setting up this pocket are shown in the accompanying plan. It is of 10-ton capacity, and is set so that the skip can be run under the pocket and filled directly without any loss of time. The pocket is hopper shaped, and made of ¼-in. plate; it is fitted with hinged bottoms opening outward, as shown. These bottom doors are braced with 40-lb. rails at the ends, abutting at the center line of the bottom of the pocket. To the ends of these rails are fastened ropes which pass up and over two 20-in. sheave wheels and down on one side of the pocket framing where they are connected to a 70-lb. rail. A latch operated by a lever, details of which are shown, holds this rail, and consequently the gates in a closed position. By releasing the latch, the weight of the ore is allowed to open the pocket bottom, but sufficient counterbalance is attached to the 70-lb. rail to swing the gates closed after the pocket has discharged. The pocket is supported from two lateral, 12x12 timbers which are carried on 12x12 cross-timbers hitched into the walls of the slope.

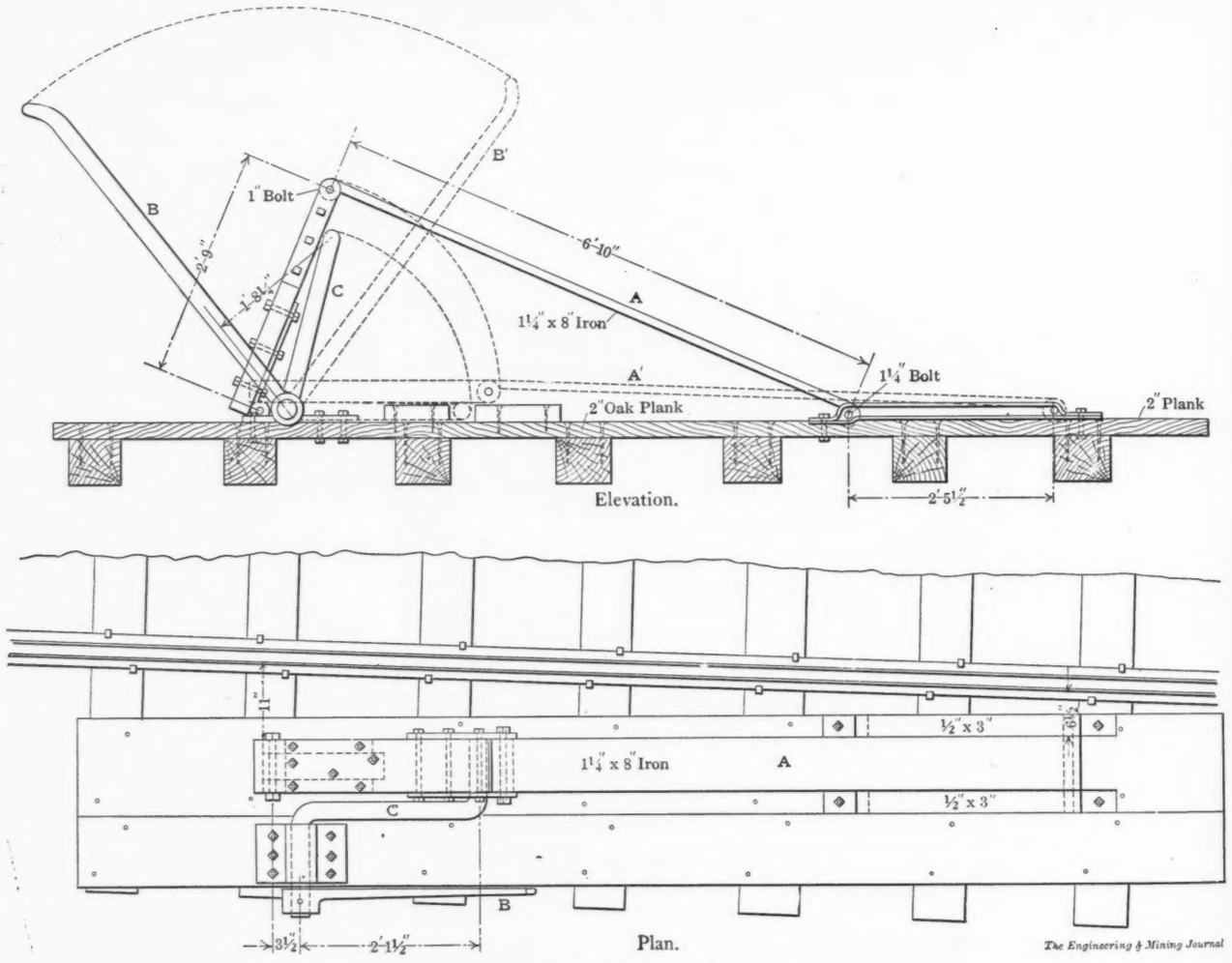
Dump Car Righter

By F. A. Kennedy.*

The accompanying sketch shows a form of car righter for a 7-yd. dump car used in connection with the open-pit mining on the Mesabi range, by the Oliver Iron Mining Company. All 7-yd. stripping cars are dumped by hand, and either righted by hand or by means of this righter. When righted by hand it takes five men from 2 to 5 minutes, while with a car righter the whole train can be righted in that length of time. Two are used, one on each side of the main track leading into the pit, so that cars dumped from either side can be righted.

When in position to right, plate *A* catches the lower edge of the dump car and throws it up into a horizontal position, the car is then locked mechanically or by hand. The righter is usually left in the position *A'*, so that it will not interfere with a passing train. As the train returns with its empty dump cars, a small lever on the engine catches the lever *B'*, and throws it into position *B*, which in turn raises the plate *A'* to the position *A*. The lever on the engine is thrown in position either by the foreman or switchman and takes but a minute.

*Chief engineer, Shenango Furnace Company, Chisholm, Minn.



ELEVATION AND PLAN OF CAR RIGHTER

Bailing Water from Prospect Shafts

It frequently develops in connection with prospecting and exploration work that it is necessary to arrange for some temporary means of raising the water from shafts. The ordinary American method, of course, is to provide the mine with wooden tubs or iron bailers, which are hoisted to the surface by the usual means. This plan works all right, but on the other hand the time-honored Mexican custom of using the bull-hide bailers has advantages in that the apparatus can be easily homemade, providing there is a ranch within the jurisdiction of the mine, and will be found quite effective and efficient in all respects. The custom of the Mexican miners is to sew one or two bulls' hides together in the form of a bag with an annular opening, to which the rope is attached. This bag is filled in the sump in the usual way and hoisted.

The Sinking Pump and its Troubles

BY M. T. HOSTER *

In sinking wet shafts, both vertical and inclined, one of the most important problems confronting the engineer is to keep the bottom of the shaft as free from water as possible and so enable the miners to do their work efficiently. The sinking of many shafts, especially in remote districts where a few days are required to get supplies, is accompanied by far too many temporary shutdowns on account of not being able to keep the water down low enough for the men to work.

Sinking pumps and bailing skips, or buckets, are the most common means of keeping the water low. For prospecting a new property, sinking a compartment shaft, or where but little water is encountered, the bailing skip has the advantage over the sinking pump for the first few hundred feet; but for single-compartment shafts or where considerable water is met with, the pump is by far the better, especially as the shaft gets deeper.

For use in inclined shafts the pump rests on its lower side; therefore it will be found best to take off the hanger irons. If they are simply turned so that the bent arms stand up, trouble will be encountered later in case the cylinder head must be taken off. For vertical shafts the pump is hung from the ring or, in timbered shafts, from the hangers. If a hose is used for suction it should be tightly wound with ¼- or ½-in. rope to prevent its being cut. The foot valve at the end of the suction hose should always be protected by a good strainer; it takes but little time to wrap some mosquito wire around this, and such a strainer may save much trouble by preventing chips of wood or the like from getting into the water valve chest.

MOST TROUBLE DUE TO VALVES OR SUCTION

Inside the valve chest are two sets of valves of two valves each; the upper are the exhaust valves, the lower the suction valves. These are soft-rubber valves set in brass valve seats and mounted centrally on brass valve rods. Each valve is forced against its valve seat by its own spring. The priming valves in the cover act as a bypass over the exhaust valve beneath them. The trouble experienced with these sinking pumps can generally be found in this valve chest or in the suction hose and its foot valve.

In case of trouble, hold open one of the suction valves and pour water down the suction hose. If it fills up and remains full it is evident that all is in good condition below. If the water leaks out examine the entire pipe; the smallest leak will cause much trouble. Hold the foot valve above water and pour water in above to ascertain whether a new foot valve is required. Foot-valve leather should always be kept on hand.

If the suction valve and foot valve are in good condition the trouble is probably in the valve chest. Be sure that the gasket under the cover is good or else air will leak in. If the priming valves leak when closed, the pump will churn its water from the exhaust-valve chamber to the suction-valve chamber and will not throw water up the shaft.

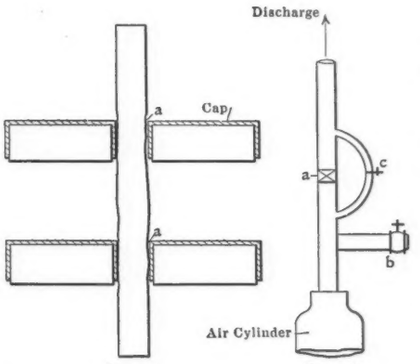


FIG. 1 FIG. 2

The Engineering & Mining Journal

VALVE AND COLUMN PIPE OF SINKING PUMP

To detect this, close the priming valves and try to blow through them; if they leak, new gaskets (preferably leather) may remedy the leak or else new valves are required. I think it best if these valves are kept tightly closed at all times and the pump primed as will be described later.

A sinking pump always handles muddy, gritty water which is bound to cut the priming-valve seats if the valves are opened to let the water through. The soft-rubber valves often become worn or cut along the edges, letting the water pass back between the valves and their seats; hence very little water will go up the shaft. To remedy this, pull out the valve rod and take the valve and cap out. The valve can be turned over on its cap, but after both sides are worn a new valve is needed.

The dirt and grit in the water will in time wear the valve rods and caps also, the result being that the caps become too loose on the rods (Fig. 1) and water will rush back past the valves through the space *a*. In one case where the sinking pump would not work, nearly the whole pump was overhauled and still it would not throw water. Finally new rods and caps were put in and the pump has worked well ever since. Only under severe conditions will new valve seats or springs be needed. The packing boxes should be kept in good condition.

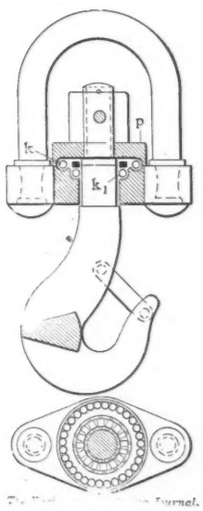
EXTRA PARTS SHOULD BE AT HAND

The air (or steam) end of the pump will probably never give much trouble, but to take out the reverse valves at times and blow air (or steam) through will be of benefit. An inexperienced pumpman will often blame his troubles on the air end and thereby make a big mistake. The following repair parts should always be kept on hand and should be bought with the pump: foot-valve leather, two priming valves, four valve caps, two valve rods, good sheet-rubber packing (⅛-in.), packing for the boxes (air and water).

The column pipe should be fitted up as is shown in Fig. 2, with a check valve *a*, priming pipe and valve *b* and bypass *c* around the check valve. The check valve relieves the pump valves of the back water pressure, and the bypass is advantageous for starting the pump. To start pumping, open up both *b* and *c*, running the pump slowly. The water column being full of water, enough water will flow through *c* to prime the pump without the priming valves being open. After the pump starts throwing water out at *b*, close *c* and keep pumping into the sump, through *b*, until all air has been pumped out. Then close *b* while pumping and the pump will take its head slowly. Should the column pipe be empty, water can be poured in at *b*.

Swivel Hook for Hoisting

The hook shown in the accompanying illustration is described in *Bergbau*, Oct. 21, 1909. The twist of the cable is taken



SWIVEL HOOK FOR HOISTING

up by the ball bearings *k* under the plate *p*. The auxiliary bearing k_1 prevents buckling. In this manner the twisting of the cable is not communicated to the bucket.

*Alvarado Gold Mining Company, Congress Junction, Ariz.

Annual Report of the Yukon Gold Company

Dredges and Hydraulic Mines Produced $1,747,599 Gross from 3,087,424 cu. yd. of Gravel; World's Largest Mining Ditch Completed

EARNING ABOUT $700,000 PER YEAR

During the season of 1909 the dredging and hydraulic operations of the Yukon Gold Company yielded a gross return of $1,747,599 and a net profit of $691,682. A total of 3,087,427 cu.yd. of gravel were handled. The holdings of the company in the Yukon were increased by the acquisition of a number of creek claims and the establishment of working agreements covering ground adjoining the property of the company, but not owned by it. The most important purchase was that of the claims of the Canadian Bank of Commerce on Bonanza creek, while the principal working agreements entered into were with the North American Trading and Transportation Company and the Canadian Mining and Dredging Company.

YUKON GOLD STATEMENT

ASSETS.

Property and investments	$11,856,999.99
Equipment, cost of ditches, dredges, pipe lines, etc.	6,073,045.26
Deferred charges, operating expenses, stripping and temporary equipment applicable to future work	491,244.09
Supplies and material	434,578.72
Accounts collectible	300,931.33
Cash	9,863.32
	$19,166,662.71

LIABILITIES.

Capital stock	$17,500,000.00
Guggenheim Exploration Co.	1,050,266.28
Accounts payable	120,849.36
Depreciation	142,731.00
Surplus	352,816.07
	$19,166,662.71

Of the work done in 1909, President S. R. Guggenheim says: "It is to be noted that the company finds itself practically one season behind in its hydraulic operations, which will necessitate some modifications of the estimate heretofore made of probable earnings for the year 1910. This, however, does not affect the estimates which are of paramount importance, such as the value per cubic yard of the property owned by the company, operating costs, etc., which have been verified by actual results. During the year the company was placed upon a dividend-paying basis at the rate of 8 per cent. per annum." Exclusive of a quarterly dividend amounting to $35,000 declared in February and payable on March 31, 1910, the company to date has distributed a total of $700,000 in dividends to its stockholders. A statement of the assets and liabilities of the company on Dec. 31, 1909 is given in the accompanying table.

Dredging

The Yukon country, in 1909, experienced a late spring with a correspondingly late opening of the navigation and mining operations. The seven dredges, the last of which was completed late in 1908, started as early as power was available. The last dredge began operation on June 9, 1909. The dredging season for six out of the seven dredges, was 132½ days as against a normal season of 140 days. The running time of one dredge, No. 5, was curtailed on account of local conditions. The dredges during the season handled 2,381,880 cu.yd., and produced $1,363,722 worth of gold. The value per cu.yd. was 57.24c. and the cost 31.94c. per cu.yd. This cost includes all thawing charges—amounting to 15.45c. per yd.—preliminary stripping operations and depreciation at the rate of $2000 per month per dredge. As an example of what may be expected in ground entirely thawed, the No. 1 dredge handled in the month of August, 100,217 yd. at a cost of 9.28c. per yard.

It is worthy of note that the actual value per yard of material handled, exceeded the estimated value based on examination results by 16.8 per cent. The cost per yard was 6 per cent. higher than the estimated cost for the season, but it is less than the estimated average cost for handling the creek deposit by 8.6 per cent. The dredges operated 83.5 per cent. of the possible running time.

Completion of the Main Ditch System

Regarding construction work and mining operations, the consulting engineer and general manager of the company, O. B. Perry, says: "The season of 1909 witnessed the completion of the main ditch system, including the Bonanza Extension to Gold Hill. After three seasons' work we now have completed over 70 miles of ditch system, 62 miles of which was in operation in 1909, and all of the remainder finished and tested before the close of the season. The ditch construction involved 6.25 miles of ditch, 4172 ft. of flume and 11,443 ft., or approximately 2.2 miles of pipe line. In order to place the water supply in the most advantageous position with regard to the deposit, it was necessary to cross Bonanza creek at Fox gulch, which was accomplished by an inverted siphon 6348 ft. in length. All the hydraulic or upper level gravels on Bonanza are now tributary to the main ditch system, making the company for the first time entirely independent of local water supply conditions.

"In addition to the extension of the main ditch system the power plant was also increased by the addition of one unit of 650 kw.. Elevator No. 3 was completed and put in commission in August. The main ditch system from Twelve Mile to Lovett, a distance of approximately 62 miles, was opened, tested and operated throughout the season of 1909. While a number of breaks, washouts and other delays were experienced, these were expected in a new ditch of this length, where a number of sections were constructed in frozen ground. The pipe lines gave excellent service and promised a delivery fully up to, if not exceeding, the estimated requirements. In connection with the maintenance of the ditch line, a large amount of construction work was done in the way of strengthening bad places and reinforcing weaknesses which developed in its operation. Permanent maintenance camps were established at numerous points along the line, all connected by telephone. Every portion of the ditch system is in direct communication with the Dawson office.

Hydraulic Mining

"During the season a total yardage of 705,544 cu.yd. was handled in the hydraulic mines. The total gross production was $383,877. The cost of this work, including the heavy charge for ditch maintenance was $294,811. The hydraulic mines, which were open at the beginning of the season actually operated an average of 23.46 days out of a season of 142 days in 1909, of 16½ per cent of the time. The yardage handled was small and the gross cost about the same as if a much larger yardage had been moved. The causes for the failure of the hydraulic operations to come up to expectations, may be briefly summarized as follows:

"(1) Delays and difficulties in the first year's operation of the main ditch due to breaks in bad ground and pipe line troubles. The result was a loss in operating time in the opened mines, and the work of opening the mines for full capacity was held back. These troubles were anticipated to a great extent, but more time was required for pipe-line repairs than estimated.

"(2) Complications with neighboring owners, which resulted in the stoppage of work on Jackson and Bear creeks.

"(3) Unusually poor season for local water supply on which the elevator operations were dependent.

"(4) Delay in receipt of materials, particularly pipe line needed for completion of the Bonanza Extension of the

main ditch. This delay made the Upper Bonanza operation dependent on local rainfall, which was the lowest ever known in the Yukon, resulting in decreased production and high cost.

SUMMARY OF SEASON'S WORK

"From the foregoing it appears that the dredging operations of the company are now in full swing and should be continued profitably for many years. The hydraulic operation has been delayed, both in completion of construction work and in getting the long water system into practical working condition. From a hydraulic-operating standpoint, we find ourselves at the beginning of the season of 1910 about where we had expected to be in 1909.

"In general the season's work has shown a distinct advance in the working out of the mining situation. The dredges have proven their practicability and usefulness. The dredge costs were lower than the season before, and the tendency is steadily downward. The elevating costs were practically cut in half as compared with the operation of the season before. The hydraulic operations have been entirely satisfactory as to recovery, and have, so far, been disappointing only in the volume of gravel handled. It is well to point out here that the hydraulic situation is improving yearly. The dredges and elevators in working out the creek claims are continually supplying new dump room and freer access to the hydraulic mines. The large amount of work expended on the main ditch last season has put it in condition for practically continuous operation. The ditch system will increase in capacity and improve generally in operating condition the longer it is run."

Explosion at the Alaska-Mexican Mine

BY ROBERT A. KINZIE *

At 11:30 p. m., March 2, 1910, the powder magazine on the 1100-ft. level of the Mexican mine, Treadwell, Alaska, exploded, killing 37 men, and injuring nine. The accompanying sketch shows the position of the mine magazine. This, with a description of our method in handling powder, is all the information I can give in regard to the explosion.

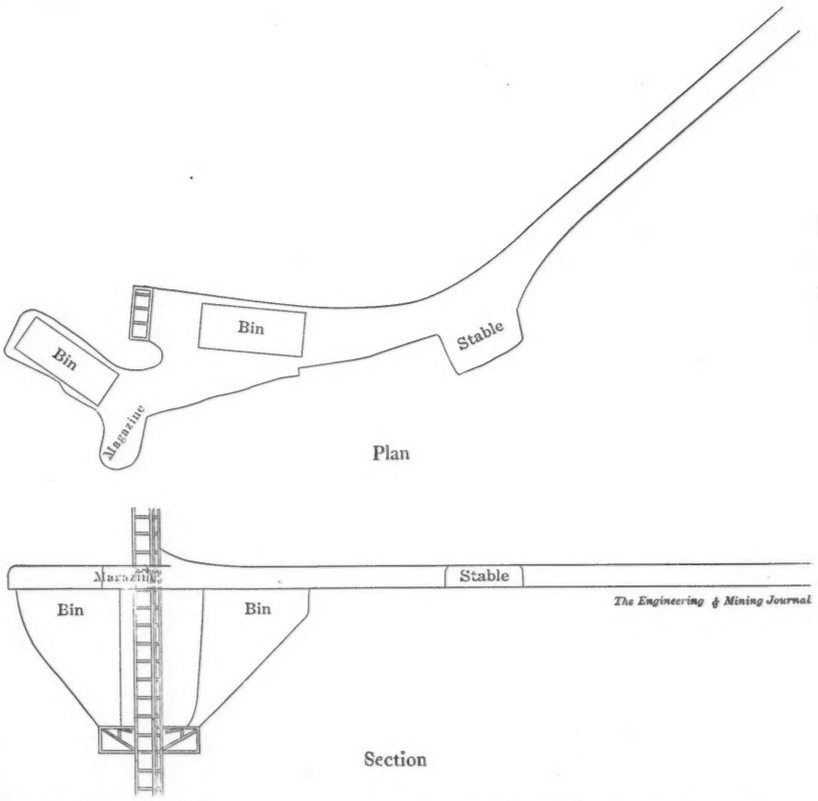
Powder is delivered once in 24 hours to the mine magazines, one of which is situated on each level. Sufficient powder is delivered for the night and day shifts, which, in this magazine, amounted to between 20 and 30 boxes. This magazine furnishes powder for the 1100-ft. level only. The magazine in question consisted of a chamber cut out of the rock and boarded up in the front. A partition divided the magazine into two rooms, and each room had a door. The door had an open grating through which the interior of the magazine could be seen from the outside. The doors were always kept locked, except at powder time, when a stope boss was in the magazine to pass out powder to the miners, who call for it.

The magazine was lighted by an incandescent 16-c.p. lamp, which was a short distance inside of the door. No wiring crossed over the stored powder. No heat was brought into the magazine, as all powder is always thawed before being delivered to the separate mine magazines.

The situation of the magazine near and beyond the shaft excludes the possibility of any men being cut off from escape in case of accident. A rescuing party was at the scene of the explosion within 35 minutes after it occurred. No one was overcome by gas, which indicates good ventilation, and, to my mind, the advantage of placing the magazine near a shaft.

The explosion occurred just at the time the shift was waiting to go to the surface for their midnight supper. Had it occurred at any other time, but few, if anyone, would have been killed. The men at the 990-ft. station, 110 ft. above, report two explosions. The first one put out their lights, but was of no great violence. They lighted their candles, and had just started for another shaft, when the second explosion of great violence occurred, knocking them over, seriously injuring one, and slightly injuring three more. One explosion consisting of a shock, followed by concussion, is probably the correct explanation. The skip-chute men, who were loading the skips from chutes 45 ft. below the station, were uninjured, and the men at the 1200 and 1300-ft. stations were uninjured.

The explosion knocked out the posts of the station set, which with lagging and other timbers, formed a mass of débris, closing the shaft. Among the débris, 22 bodies were recovered; five injured men were also taken up. As ore was being hoisted from the 1100-ft. level, the doors



THE 1100-FOOT LEVEL OF THE ALASKA-MEXICAN MINE WHERE THE EXPLOSION OCCURRED

*General superintendent, Alaska Treadwell Gold Mining Company, Treadwell, Alaska.

were down, closing the hoisting compartment below the skip chutes. One body was found on these doors. The man-cage compartment was open and eight bodies were recovered from below in this compartment of the shaft. The stable, a light board shed, was entirely demolished. Here two bodies were recovered. The stable contained two horses; one was killed, the other uninjured. Two bodies were recovered along the drift between the station and the shaft, and the fragments of at least one body were found in a corner of the magazine.

Other than knocking out the posts of the station set and the guides opposite the level there was no damage to the shaft. By 10:30 a. m. the guides were put in for the man cage, which was then free to operate from the top to the bottom of the shaft. I have absolutely no clew to the cause of the explosion, and cannot account for it.

Goldfield Consolidated

The Goldfield Consolidated production for February is shown in an accompanying table. The estimated recovery was 93.74 per cent., or $684,291.

FEBRUARY PRODUCTION.

	Dry Tons.	Approximate Value	Per Ton.
Combination	6,034	$109,034	$18.07
Mohawk	7,370	131,010	17.78
Red Top	5,988	194,322	32.45
Clermont	4,474	295,554	66.06
Total	23,866	$729,920	$30.58

The mill made a particularly good showing. The costs showed no reduction, on account of the expense of repairing the fire loss of January, but the mill showed the best extraction in its history both on crude ore and concentrates. The extraction in the concentrate plant exceeded 95 per cent. for the latter two-thirds of the month.

Development Work

The advance at the various mines was as follows: Combination, 419 ft.; Mohawk, 795; Clermont, 1135; Red Top, 1050; total, 3399 ft. The amount advanced was much less than in January, but the results were more fortunate. The decline in amount done is due to some extent to the shortness of the month, but more particularly to a partial breakdown of the Mohawk hoist which prevented that machine from working in counterbalance and caused it to use more air. This made it necessary to curtail development a little.

Neglecting as usual the mere tracing out of known orebodies between levels and confining attention to exposure of new ore on main levels, the following facts may be noted: Red Top 330-ft. level, 325 tons at $15 and 110 tons at $13; Clermont 600-ft. level, 285 tons at $6, 750-ft. level, 1182 tons at $44, 1000-ft. level, 248 tons at $22.70; total, 2150 tons at $30.50 per ton.

FEBRUARY COSTS.

		Amount.	Per Ton.
General—			
Bullion tax and marketing bullion		$14,000	
Administration, corporation, legal, taxes, etc.		13,000	
		$27,000	$1.13
Mining		95,569	4.00
Transportation		3,424	0.14
Milling—			
Milling and cyaniding	$55,800		
Marketing concentrate residues	17,000	$72,800	$3.05
Net cost		$198,793	$8.32
Loss in tailings		$45,629	1.92
Total costs and losses		$244,422	$10.24
Profit per ton		$20.34	
Total value of ore		$30.58	
Total profit for month		$485,498	
Percentage of profit		66.5	

Manager Finley says: "It seems fair to say that the development put in sight the following approximate amounts: Clermont, between 900 and 1000 levels, 17,000 tons at $20, above and below the 750 level, 14,000 tons at $44, above the 600 level, 18,700 tons at $10; Red Top, above the 330 level, 2000 tons at $14; total, 51,700 tons at $22 per ton. It is difficult to form an idea of just what this ore will average, but the best guess I can make is the above. This ore is at best only developed on two sides, some of it only on one side. It cannot, therefore, be called anything more than partially developed ore and any estimate may go astray. It seems fair to say, however, that the developments for January and February have been, by a considerable margin, in excess of extraction both in tonnage and in value."

Encouraging Returns from the Clermont

The 1000-ft. level of the Clermont is developing favorably. About Feb. 18, a small streak of good ore appeared. It assayed from $10 to $100 per ton for a few rounds but was too small to make the drift profitable. About the 25th, the streak began to show great improvement both in size and value and for the last two days of the month the car samples showed good ore, 41 tons averaging $33. There is some reason to hope that this oreshoot may prove better on the 1000- than on the 900-ft. level.

A development that cannot be other than important is the discovery, in the last two days of the month, of the continuation of the Mohawk oreshoot on the 750-ft. level of the Clermont. The vein is 8 ft. thick where cut in a crosscut southwest of the large Clermont orebody. The samples taken from the face indicate from $20 to $30 but the car samples taken thus far show an average of only $9 per ton. This latter ore must have been mixed with a good deal of waste.

Cleopatra Mining Company, Ltd.

The Cleopatra Mining Company, Ltd., is issuing flamboyant literature and doing sensational advertising in one or more of the popular magazines. The capital stock of the company is $2,000,000, divided into shares of $1 each, of which more or less have been sold at 50c. The financial arrangements of the company are not explained in the "literature" that has come to our attention.

The company states that it owns property in the Larder Lake district, in the Rainy River district, and in the Cobalt district. Upon the last is the chief emphasis placed and we shall confine our review to it.

This property is said to comprise 1056 acres, upon which nine veins have been uncovered. The most important of these are considered to be "the two upon which shafts are now being sunk." The following excerpts are from one of the pamphlets issued by the company:

"The silver veins on Cleopatra have been definitely located, and traced for hundreds of feet on the surface. Samples from these veins have been assayed and have been proved to be silver bearing."

"A few months ago Cleopatra was a prospect, but still a speculation. Two months ago we had reached the point where the speculative element had given place to a feeling of assurance. A month ago, with Professor Hassan's discovery on our property of the La Rose-University vein, Cleopatra's success became certain; and now Cleopatra becomes a sure, and wonderfully attractive investment."

In another document we find the following statements:

"On *all* our three great properties the shafts are being driven down to tap the rich bodies of ore at a depth of 100 to 200 ft. It is no longer a question of months, but a matter of weeks before Cleopatra joins the ranks of the big shipping mines."

"In contrast to our other two properties, which are low-grade ore, our Cobalt veins contain the richest and highest grade ore. Native silver has been found."

"The high-grade ore of our Cobalt properties should average a net profit of over $500 per ton. A vein 1 in. wide and 100 ft. long and deep can produce $1,000,000. We have *already* uncovered *nine* veins."

Respecting this company, a reliable mining engineer has reported to us under date of March 4, 1910, as follows:

"The Cleopatra claims are situated in the Gillies limit, and were purchased from the Government by Bannell Saw-

yer, of Montreal. Considerable trenching was done, but no discoveries of importance were made. At one point some calcite was found in some broken up and partially decomposed diabase, and one or two little flakes of silver were noticed. Some of the diabase gave low assays in silver. A shaft has been started and is now down about 30 ft. The property is only a prospect and not a mine in any sense of the word. It is promising only on account of its fairly favorable location. Up to date no ore of commercial value has been found."

An expert examination of the company's own literature shows that the Cobalt property of this company is distinctly a prospect only, just as our correspondent states, but this would not be apparent to the uninitiated and the bald statements that we have quoted are not only of a nature to mislead, but also have substantially nothing to support them except the hopes of the promoters.

Standardization Recommendations to the Institution of Mining and Metallurgy

The sectional committee of the Institution of Mining and Metallurgy on the standardization of bullion and assay values has submitted the following recommendations for adoption by the institution:

(1) Assay reports shall state the exact condition of the sample as to dryness when assayed.

(2) Assay values of gold and silver ores and products shall be represented in pennyweights and decimals or in ounces and decimals, and not in ounces, pennyweights and grains. They shall be expressed in terms of fine gold and fine silver respectively, not as "bullion."

(3) Assay values of alluvials shall be reported in grains and decimals of a grain of "fine" gold, or in pence (at 2d. per grain of "fine" gold), or cents per cubic yard. It is recommended that, in the absence of specific information, 1 cu.yd. of ordinary alluvial, excluding boulders, be taken as equivalent to 3000 lb. (1½ short tons).

(4) In reporting assay values of cyanide and other solutions, the results shall be given in parts by weight in a stated value of the solution. (In the case of cyanide solutions, the use of the "fluid ton of 32 cu. ft." is recommended. It closely approximates to 2000 lb. and is in common use.)

(5) When it is necessary to state or estimate the money value of an ore, etc. (other than of gold), it shall be accompanied by the assay value, and the basis on which the former has been calculated from the latter shall be stated.

(6) Laboratory sieving tests shall be made with the Institution of Mining and Metallurgy standard sieves, or, when other sieves are used, the widths of the apertures shall be stated.

The council of the institution will receive until June 30, 1910, any suggested alterations or additions before taking action on the recommendations of the committee.

Conservation Work of the Geological Survey

During the last twelve months the conservation work of the Geological Survey has included investigations relating to coal, oil, and phosphate deposits.

Coal-land withdrawals were made covering 7,675,000 acres not previously withdrawn and the form of withdrawal affecting an additional 9,000,000 acres was changed to cover all forms of entry instead of coal entry alone.

Under the old regulations the maximum price per acre for coal land was fixed at $75; under the new regulations the maximum price per acre thus far fixed for any particular area is $465.

Phosphate Land Withdrawals

Phosphate-land withdrawals in force March 4, 1909, covered all vacant public lands in an area comprising 4,493,551 acres in Wyoming, Utah and Idaho. During the year areas covering 2,389,141 acres were restored to entry, for the field work showed that they contained no phosphate. Additional withdrawals including 399,693 acres have been made and the form of withdrawal has been changed so as to cover entered as well as vacant lands. All unpatented lands in an area of 2,504,103 acres are now affected by phosphate withdrawals.

Western Oil Lands

The California oil-land withdrawals made prior to March, 1909, aggregating 2,313,482 acres, prevented the acquisition of the withdrawn lands only under the agricultural-land laws. All lands covered by these withdrawals could be legally exploited for oil or other minerals. During the year these lands were excepted from acquisition as oil or as mineral lands as well as for agricultural use. New withdrawals were made in the States of California, Colorado, Oregon, Utah and Wyoming of a total area of 2,130,510 acres. In California there were restored to entry 956,916 acres that field examination had shown to be non-oil land. The area now covered by oil withdrawals is 3,487,076 acres.

February Oil Dividends

The accompanying table gives the amount of dividends paid by a number of California oil companies during February, 1910, together with their total dividends to date, as reported by the California Stock and Oil Exchange, San Francisco.

Name of Company.	February, 1910, Dividend.	Total Paid to Date.
American Petroleum	126,735	$929,960
Bay City	20,000	90,000
Caribou	20,175	680,355
Claremont	10,000	315,000
Columbia	9,992	264,804
Euclid	3,500	120,500
Four	3,000	213,000
Home	2,000	472,000
Homestake	1,000	77,250
Illinois Crude	2,000	86,000
Mascot	5,000	5,000
Mexican Petroleum	85,616	3,391,626
Palmer	18,020	232,340
Paraffin	3,000	12,000
Pinal	14,992	872,109
Record	7,500	47,500
Rice Ranch	3,000	96,000
Royalty	400	8,400
S. F. & McKittrick	15,000	325,000
Sauer Dough	4,987	512,316
Silver Tip	7,500	30,000
Superior	5,000	57,500
Traders	14,000	165,186
Union	124,813	6,243,442
United Petroleum	40,375	2,138,584
Wabash	3,000	117,000
Total for February	$550,605	

Allouez Mining Company

In the year ended Dec. 31, 1909, Allouez made an actual profit of $70,432, but this was reduced to $3065 by the expenditure of $67,367 on No. 2 shaft. The accompanying table shows the operation of this Lake Superior company for the year:

RESULTS AT ALLOUEZ IN 1909.

Tons of rock stamped	253,049
Cost of mining, transportation, stamping and taxes per ton of rock	$1.540
Cost of No. 2 shaft expense per ton of rock	$0.266
Pounds of mineral obtained	6,384,450
Pounds of refined copper produced	4,031,532
Per cent. of refined copper in mineral	63.14
Pounds of refined copper per ton of rock stamped	15.93
Cost per pound at mine, including construction and No. 2 shaft expense	9.67c.
Cost per pound at mine, No. 2 shaft expense	1.67c.
Cost per pound construction	0.21c.
Cost per pound of smelting, freight, commission, eastern office and all other charges	1.51c.
Cost per pound of interest paid	1.33c.
Total cost per pound refined copper	13.39c.

Out of 258,234 tons of rock broken, only 5185 tons (2.01 per cent.) was discarded. The company closed the year with a balance of $31,391 on hand.

Correction

In the Anaconda statement published in the JOURNAL of March 5, all the items in the 1909 column of the comparison table except the production of the metals represented the first six months of the year only.

The Bureau of Mines Bill

SPECIAL CORRESPONDENCE

Senator Dick, of Ohio, chairman of the Senate committee on mines and mining, is of the opinion that the Bureau of Mines bill will be brought to a vote in the Senate within a comparatively short time and will be passed. He thinks it is possible that the bill may be voted upon within two weeks although he anticipates that it will require a longer time than that to arrange matters for its adoption.

The Bureau of Mines bill is now on the calendar of the Senate, having been voted out of committee on March 7, the official report becoming available a few days later. This report was made by a unanimous ballot in the committee. It is understood that Senator Bailey in behalf of the Democrats is planning to make a speech against the measure whenever it is pressed for passage.

CHANGES IN THE BILL

Senator Dick believes that the bill in the form in which it is now before the Senate is satisfactory to President Brunton, of the American Institute of Mining Engineers, who lately appeared before the committee on mines and mining and advocated the measure subject to a few changes which have now been introduced into it. The most important changes that have been made in the bill in reporting it are the omission of the words "To foster, promote and develop the mining industries of the United States," which were used in describing the function of the bureau, and the omission of Section 5 which provided for terminating the work of the technologic branch of the geological survey, provision for such cessation being made in other language in Section 4. Section 5 is new and provides that "nothing in this act shall be construed as in any way granting to any officer or employee of the Bureau of Mines any right or authority in connection with the inspection or supervision of mines or metallurgical plants in any State or territory." The act is also made to take effect immediately upon its approval instead of upon July 1, 1910.

FUNCTIONS OF THE BUREAU

In the report which has been prepared to accompany the Bureau of Mines bill the function of the proposed bureau is set forth along the lines that will be pursued in the Senate discussion as follows:

"The function and duties proposed for the Bureau of Mines are limited to the making of inquiries and scientific investigations for the benefit of the mining industry and publishing the results of these inquiries and investigations in such manner as will render them most useful to the industry.

"It is a matter of no concern that the bureau will have no authority to enforce the adoption of its recommendations. Indeed, it is neither necessary nor desirable that it be clothed with this authority, for the exercise of the authority would consume the energies of the bureau and would jeopardize the chief purpose for which it was created—the making of thorough and impartial investigations.

"Even in other countries where the general government controls the inspection of mines experience has demonstrated the wisdom of having the investigation and the inspection under different officials. In this country the success and usefulness to the mining industry of the Bureau of Mines in conducting thorough and impartial investigations will be greater by virtue of the fact that it can have no part in the inspection or supervision of mines, and that function should continue to rest with the several States. . . . . .

"The essential purpose of the proposed Bureau of Mines is to provide scientific inquiries and investigations for the benefit of the mining industry, such investigations as will aid in making mining in the United States less wasteful of life and resources. These investigations will be useful to the States in the enactment of better and more uniform laws and regulations; useful to the State inspectors, operators and miners, by supplying them with reliable data concerning explosives, gas, dust, mine fires and other factors entering into the problem of mine safety; useful in solving the problems of the more efficient treatment and use of metallic mineral products; useful to the general public as supplying impartial data as the basis of intelligent public opinion.

"It will be the purpose of this bureau to make inquiry and investigations to discover the various causes of each type of mine accidents, and the best preventive measures; to aid in developing a uniform code of signals for use in mine operations, and a system of warning signals indicating when men should leave one or all parts of the mine, and the route to be taken so as to avoid the poisonous gases; to develop more efficient and cheaper methods of mine-rescue work; and to develop more effective methods of preventing or fighting mine fires."

The report refers to mining as a "giant, unorganized industry," calling for the leadership to be afforded by the proposed Bureau of Mines, and harks back to the question of what such a bureau could or should do, among which are the following proposals:

"Unification of the system of inspection and ratings of fuse, detonators and explosives, the variation in speed of fuses being claimed as the most fruitful source of mining accidents.

PROCESS INVESTIGATIONS

"Systematic investigations into both theory and practice of the different methods of concentration and their adaptability to various kinds of ores. Within the last few years there have been developed a number of new methods of ore dressing but the adaptability of the different methods to different types of ores is little understood. Even when individual tests by the various companies are successful it is a useless waste of capital to have these examinations duplicated all over the country, under such imperfect conditions that it is rare for two experimental plants operating on similar ores to obtain the same results.

"The best method of performing the separation of different minerals from each other so that each may be marketed to the greatest possible advantage. A correct process to adopt for any given ore is too often a matter of conjecture instead of scientific knowledge. Hence enormous amounts are lost each year not only to Western miners but to Eastern investors, who furnish the capital for the erection of now-idle mills and smelteries and who bemoan their losses and declare that mining is a wild gamble; whereas, if based on proper knowledge, it can be made as legitimate and safe as any other department of industry. A thoroughly organized and equipped national mining bureau, through its investigations of these fundamental methods in relation to different types of ores, in a few years would lift many departments of metallurgy from their present partially understood reactions and haphazard application to the domain of something like an exact science, and would render incalculable service to the industry.

"A great barrier to large metallurgic developments in many portions of the West is the lack of coking coal. Coals abound, but they will not coke; and the fundamental need which a bureau of mines should supply is a knowledge of these coals—still largely owned by the Government—as to why they will not coke, and what can be done by changes in treatment, mixing, etc., with a view to overcoming this difficulty."

Finally the report lays great stress on the possible services of the bureau in promoting "conservation." It maintains that the bill as proposed has the indorsement of the principal interests affected. It seems doubtful, however, that the majority of mining men will have greater faith in the efficiency of a governmental bureau in accomplishing many of these proposed investigations in a more effective manner than is now done by private industry as represented by our consulting mining and metallurgical engineers, experimental-testing plants and the manufacturers of metallurgical equipment.

Mineral Production of Canada in 1909

Total Value of Production $90,415,763. Gold, $9,790,000. Silver, 27,878,590 oz. Copper, 54,061,106 lb. Nickel, 26,282,991 Pounds.

BY JOHN MCLEISH*

The total mineral production of Canada in 1909 is valued, according to the preliminary returns, at $90,475,763, of which $45,188,387 is for metallic products; $30,587,591 for nonmetallic products; $14,339,785 for structural materials and clay products; $300,000 for estimated value of products not reported. These figures are subject to small corrections from later returns.

MINERAL PRODUCTION OF CANADA.

METALLIC.		1908.	1909.
Antimony ore (exports)	Tons	148	.....
Copper	Lb.	62,702,873	54,061,106
Gold	Oz.	476,112	473,633
Pig iron from Canadian ore	Tons	99,720	149,444
Iron ore (exports)	Tons	.....	21,956
Lead	Lb.	43,195,733	45,857,424
Nickel	Lb.	19,143,111	26,282,991
Cobalt	Value	$113,273	$90,950
Silver	Oz.	22,106,233	27,878,590
Zinc ore	Tons	452	.....
Zinc	Value	.....	$250,000
NONMETALLIC			
Arsenic	Value	$58,566	[$64,100
Asbestos	Tons	66,548	63,349
Asbestic and asbestic sand	Tons	24,225	23,951
Calcium carbide	Tons	6,864	.....
Chromite	Tons	7,225	1,794
Coal	Tons	10,886,311	10,411,955
Corundum	Tons	1,089	1,491
Feldspar	Tons	7,877	10,286
Graphite	Tons	465	730
Grindstones	Tons	3,843	3,965
Gypsum	Tons	340,964	468,551
Limestone for flux	Tons	418,661	526,076
Magnesite	Tons	120	330
Mica	Value	$139,871	$154,106
Mineral waters	Value	$151,953	$177,304
Natural gas	Value	$1,012,660	$1,205,943
Petroleum	Bbl.	527,987	420,755
Phosphate	Tons	1,596	597
Pigments — ocher and barytes	Tons	9,058	4,119
Pyrites	Tons	47,336	57,038
Quartz	Tons	44,741	50,541
Salt	Tons	79,975	84,037
Talc	Tons	1,016	4,506
Tripolite	Tons	30	.....
Estimate for minerals not reported	Value	$300,000	$300,000

In the accompanying table the production for 1908 and 1909 of metallic and nonmetallic substances is given, the production being stated in quantities, except for cobalt, arsenic, mica, mineral waters and natural gas, for which the values are given.

The values of structural material and clay products are made up as follows in 1909: Cement, $5,266,008; clay products, limes, etc., $6,805,639; stone, $2,268,138; being $14,339,785 in all.

General statistics of the production of smelting and refining works in Canada were collected for the first time in 1908. The accompanying table shows the results for two years, the works at Northport, Wash., being included, since they treat Canadian ore chiefly.

The total ore charged to the furnaces in 1909 was 2,377,780 tons, of which slightly over 40,000 tons were imported. The products exported for refining included, in 1908, copper matte, 7649 tons; blister copper, 15,418 tons; bessemer nickel-copper matte, 21,210 tons and silver-cobalt-nickel speiss, 1326 tons. In 1909 these smeltery products were base bullion, 2010 tons; copper matte, 11,597 tons; blister copper, 14,239 tons; bessemer nickel-copper matte, 25,845 tons; silver-cobalt-nickel speiss, 2660 tons.

PRODUCTION OF SMELTING AND REFINING WORKS.

Products.		1908. Refined Products.	1908. Metals Contained in Matte, Blister, Base Bullion, and Speiss Exported.	1909. Refined Products.	1909. Metals Contained in Matte, Blister, Base Bullion, and Speiss Exported.
Gold	Oz.	15,436	203,300	18,241	200,129
Silver	Oz.	11,168,689	3,271,899	14,242,545	4,845,920
Lead	Lb.	36,549,274	1,116,792	41,883,614	3,973,810
Copper	Lb.	.....	51,965,289	.....	53,328,583
Copper sulphate	Lb.	203,379	.....	51,405	.....
Nickel	Lb.	.....	19,506,251	.....	27,041,857
Cobalt	Lb.	.....	692,170	.....	1,721,083
White arsenic	Lb.	1,431,052	.....	2,258,087	.....
Arsenic	Lb.	.....	436,787	.....	1,074,516

The total ore charged to the furnaces in 1909 was 2,377,780 tons, of which slightly over 40,000 tons were imported. The products exported for refining included, in 1908, copper matte, 7649 tons; blister copper, 15,418 tons; bessemer nickel-copper matte, 21,210 tons and silver-cobalt-nickel speiss, 1326 tons. In 1909 these smeltery products were base bullion, 2010 tons; copper matte, 11,597 tons; blister copper, 14,239 tons; bessemer nickel-copper matte, 25,845 tons; silver-cobalt-nickel speiss, 2660 tons.

practically all from the Cobalt district, a portion of the ores (8384 tons in 1909) is treated in Canadian metallurgical works producing silver bullion, white arsenic, and a speiss containing silver, cobalt, nickel, etc., the balance of the ore being exported for treatment abroad. The total production of recoverable silver in Canada is estimated at 27,878,590 oz., valued at $14,358,310. The production from the Cobalt district again shows a considerable increase over the previous year, but not so large an advance as was made in 1908 over 1907. According to returns received from 31 shipping mines, there were shipped during 1909 about 28,042 tons of ore and 2967 tons of concentrates. The silver contents of ore shipped are returned as 22,581,788 oz., or an average of 805.28 oz. per ton, and for the concentrates shipped 3,639,475 oz., or an average of 1,226.65 oz. per ton. Bullion shipped from the mines contained 143,440 fine oz. silver.

The total silver contents of ore, concentrates and bullion shipped from the mines was 26,364,703 oz. The mineowners receive payment for only 93 to 98 per cent. of the silver contents; and in valuing the production, a deduction of 5 per cent. is made from silver contained in ore and concentrates to cover losses in smelting and refining. On this basis, the silver recovery is estimated at 25,128,590 oz. Payments for cobalt contents were reported as $90,750; the total value of the year's output was a little over $13,000,000, without deductions for freight and treatment charges.

The number of men employed in shipping mines was reported as 2768, and wages paid $2,396,742. Incomplete returns of concentration showed 127,271 tons of ore treated, producing 3213 tons of concentrates. In 1908 the shipments

METALLIC PRODUCTS—GOLD

A preliminary estimate shows a slight decrease in gold production in 1909. The total production in 1908 was $9,842,105, to which the Yukon district contributed $3,600,000; British Columbia, $5,929,880; Nova Scotia, $244,799. In 1909 the Yukon shows a further increase, the value of the gold being estimated at $3,960,000. The total gold exports on which royalty was paid were, according to the records of the Interior Department, during the calendar year, 239,766 oz. Complete statistics are not yet available as to the gold production in British Columbia, but the returns received appear to indicate a reduced output. The production in Nova Scotia will not differ much from that of the previous year.

SILVER

The rapid growth of Canada's silver production which has taken place during the past few years continued during 1909. Increased production is reported from both British Columbia and Ontario.

In Ontario, where the production is

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NOTE—Abstract of "Preliminary Report on the Mineral Production of Canada during the Calendar Year 1909," Canadian Department of Mines, Mines Branch. Government Printing Bureau, Ottawa, Canada.

were 25,682 tons of ore and concentrates containing 19,398,545 oz. of silver, or an average of 755 oz. per ton.

Exports of silver from Canada in 1909 were 31,126,504 oz., as reported by the customs department.

Copper

Statistics are not available at the present time to show the total quantity of copper contained in ores shipped from the mines. The total production of copper, however, contained in blister and matte produced and estimated as recoverable from ores exported, was in 1909 approximately 54,061,106 lb. In 1908 the production of copper estimated on the same basis was 52,928,386 lb., an increased production of about 2 per cent. being, therefore, shown in 1909. Of the production in 1909, Ontario is credited with 15,746,699 lb. and British Columbia with 37,314,407 lb. The total exports of copper in ore, matte and blister were 54,447,750 lb., valued at $5,832,246, according to customs-department returns.

Lead

The total production in 1909 of pig and manufactured lead and lead contained in base bullion exported was 45,857,424 lb. It is possible that there was also some lead ore or lead concentrates exported, of which no record has yet been received. Customs-department statistics indicate such an export of upward of 2,000,000 lb. The production of refined lead, and lead contained in base bullion exported in 1908, was 37,666,066 lb. Customs-department statistics in this year also indicate an export of lead ore or concentrates, and the total production in 1908, of lead available for consumption was estimated at 40,891,448 lb.; an increased production in 1909 is, therefore, shown of from 5,000,000 to 7,000,000 lb. This production in both years was all from the province of British Columbia. The total amount of bounty paid during the twelve months ending Dec. 31, 1909, on account of lead production was $346,528. The exports of lead in ore, concentrates, base bullion, etc., during the year were 3116 tons and of pig lead 5650 tons, or a total of 8766 tons. From 14,000 tons to 15,000 tons of domestic production were, therefore, available for home consumption.

Nickel

The nickel industry was particularly active during 1909, the largest production on record being shown. Although important quantities of nickel are contained in the cobalt-silver ores of Coleman township, the Sudbury district continues to be the chief source of nickel production. The same companies are carrying on active operations: the Mond Nickel Company at Victoria Mines and the Canadian Copper Company at Copper Cliff. The ore is first roasted and then smelted to a bessemer matte containing from 77 to 82 per cent. of the combined metals, copper and nickel, the matte being shipped to the United States and Great Britain for refining. The total production of matte in 1909 was 25,845 tons, valued at the furnaces at $3,913,012. The metallic contents were: Copper, 15,746,699 lb.; nickel, 26,282,991 pounds.

The aggregate results of the operations on the Sudbury district nickel-copper ores during the past two years are as follows, in short tons:

	1908.	1909.
Ore mined	409,551	451,892
Ore smelted	360,180	462,336
Bessemer matte produced	21,197	25,845
Bessemer matte shipped	21,210	.....
Copper contents of matte shipped	7,503	7,873
Nickel contents of matte shipped	9,572	13,141
Spot value of matte shipped	$2,930,989	$3,913,012
Wages paid	$1,286,265	$1,234,903
Men employed	1,690	1,735

Exports of nickel in ore, matte, etc., for the year 1909 were 25,616,398 lb., of which 21,772,635 lb. went to the United States, and 3,843,763 to Great Britain.

The mineowners received no payment for nickel contents of silver-cobalt ores, and complete statistics are not available as to the total quantity of nickel contained in these ores, of which about 31,609 tons were shipped during 1909. Of the total shipments, 8384 tons were treated in Canadian metallurgical works at Copper Cliff, Deloro and Thorold, producing silver bullion and white arsenic; the remaining speiss or residues amounted to 2660 tons and contained silver, cobalt, nickel and arsenic, the nickel contents being 758,966 lb. and the cobalt contents 1,721,083 lb. in all.

Iron Ore

The total shipments of iron ore from mines in Canada in 1909 were 268,043 short tons, valued at $659,120, as compared with 238,082 tons valued at $568,189 in 1908. The shipments in 1909 may be classified as magnetites, 73,420 tons; hematite, 190,473 tons; bog ore, 3330 tons; titaniferous magnetite (sand) for experimental purposes, 820 tons. In 1908 the ore shipped included magnetite, 49,946 tons; hematite, 173,164 tons; carbonate ore, 4869 tons; bog ore, 10,103 tons. Exports of ore from Canada during 1909, as recorded by the customs department, were 21,956 tons.

Iron and Steel

An increase of 20 per cent. is shown in the production of pig iron in Canada in 1909 as compared with 1908, despite the fact that the Londonderry furnace was out of commission during the whole year. The figures do not include the output from electric-furnace plants, making ferro products, which are situated at Welland and Sault Ste. Marie, Ontario, and Buckingham, Quebec.

Of the total output of pig iron during 1909, 17,003 tons were made with charcoal as fuel and 740,159 tons with coke. The classification of the production in 1909, according to the purpose for which it was intended, was as follows: Bessemer, 222,931 tons; basic, 400,921 tons; foundry, including miscellaneous, 116,307 tons.

The amount of Canadian ore used during 1909 was 231,994 tons; imported ore, 1,234,990 tons; mill cinder, etc., 25,508 tons. The amount of coke used during the year was 919,271 tons, comprising 412,016 tons from Canadian coal and 507,255 tons imported coke or coke made from imported coal. The consumption of charcoal was 1,782,258 bu. Limestone flux was used to the extent of 526,076 tons. In connection with blast-furnace operations there were employed 1486 men and $879,426 were paid in wages. The total daily capacity of 16 completed furnaces was, according to returns received, 2735 tons. The number of furnaces in blast on Dec. 31, 1909, was 11. The production of pig iron by provinces in 1908 and 1909 was as follows:

	1908.	1909.	Changes.
Nova Scotia	352,642	345,380 D.	7,262
Quebec	6,709	4,770 D.	1,939
Ontario	271,484	407,012 I.	135,528
Total tons	630,835	757,162 I.	126,327

Returns were received from eight steel plants, at which 2073 men were employed, showing a production of 754,719 tons in 1909, as against 588,763 tons in 1908. About two-thirds of the 1909 output was from the basic open-hearth process. A statement of the bounties paid on iron and steel during the year 1909 is furnished by the Trade and Commerce department. As no bounty is paid on iron made from mill cinder or ingredients other than ore, the figures do not show the total output of the furnaces, but only those quantities on which bounty was paid. The totals were: Pig iron from Canadian ore, $214,706; pig iron from imported ore, $425,402; steel ingots, $766,470; steel wire rods, $488,433; total $1,895,011, being a decrease of $103,273 from the preceding year.

Asbestos

While shipments of asbestos decreased 3473 tons in 1909, the stocks on hand, Dec. 31, were about 20,920 tons, as compared with stocks, Dec. 31, 1908, of 8669 tons. The total shipments in 1909 amounted to 63,349 tons of asbestos, valued at $2,284,587, and 23,951 tons of asbestic valued at $17,188.

The asbestos shipments were divided into five grades, crude Nos. 1 and 3, and mill stock Nos. 1, 2 and 3, varying in value from $270 down to $9.37 per ton. About 3000 tons of crude were shipped and 60,000 tons of mill stock, the best

grade of which was valued at slightly over $50 per ton. Exports of asbestos, according to customs returns, were 56,971 tons in 1909, a decrease of 4239 tons.

Arsenic

The total output of white arsenic as reported by three firms making this product, was 2,258,187 lb., valued at $64,100. In addition the residues or speiss from these works exported contained 1,074,511 lb. of arsenic. This is all obtained from that portion of the Cobalt ores treated in Canada. No record is available of the total arsenical contents of these ores. The exports of arsenic are reported as 3,111,249 lb. in all, valued at $119,673.

Corundum

The quantity of corundum ore treated during the year was 35,894 tons, from which was produced 1579 tons of grain corundum. The total shipments were 1491, valued at $157,393, or an average of a little over 5c. per pound.

Coal and Coke

The total coal production in Canada in 1909, comprising sales and shipments, colliery consumption and coal used in making coke, is estimated at 10,411,955 short tons, valued at $24,431,351. This is a smaller production than in either of the two preceding years. The western provinces each show an increased production of coal in 1909, but not sufficient to counteract the reduced output in Nova Scotia, which resulted from the coal miners' strike. The aggregate decrease for the whole of Canada was about 474,356 tons, or 4.4 per cent., while Nova Scotia alone showed a falling off of 968,789 short tons, or 14.6 per cent., the aggregate increase in the western provinces being 505,404 tons, or 12.1 per cent. Of the total production, Nova Scotia contributed 54.5, Saskatchewan and Alberta 20.5, and British Columbia 24.3 per cent.

The production by provinces was approximately as follows, the figures for 1907 and 1908 being also given:

Province.	1907.	1908.	1909.
Nova Scotia...	6,354,133	6,652,539	5,683,750
British Columbia.....	2,364,898	2,333,708	2,538,004
Alberta.....	1,591,579	1,685,661	1,978,843
Saskatchewan.	151,232	150,556	163,329
New Brunswick.....	34,584	60,000	49,029
Yukon Territory.....	15,000	3,847	.....
Totals.....	10,511,426	10,886,311	10,411,955

The total production of oven coke in 1909 was 875,080 short tons, valued at $3,557,147, being a slight increase over the production in 1908. At the ovens of the Dominion Iron and Steel Company at Sydney, a quantity of imported coal was used, the supply of domestic coal being insufficient on account of the strike. The Atikokan Iron Company at Port Arthur uses imported coal exclusively. At all other ovens Canadian coal is used. At the end of the year there were in Nova Scotia 670 ovens in operation, 64 idle and 120 building. In Alberta 226 were in operation and 40 idle, and in British Columbia 767 in operation and 753 idle. The ovens of the Dominion Iron and Steel Company are of the Otto Hoffman by-product type and there were recovered as by-products 4,016,824 gal. of tar and 3351 short tons of sulphate of ammonia.

Feldspar

Total shipments of feldspar are reported as 10,286 tons, valued at $35,694. This includes a quantity of high-grade "dental spar" shipped from the Villeneuve mine, Quebec, and valued at from $16 to $20 per ton at Buckingham.

Petroleum and Natural Gas

The production of crude petroleum was, as usual, nearly all derived from the Ontario peninsula. Direct returns from the producers have not been obtained, but the production upon which bounty was paid, ascertained by the Trade and Commerce department, was 14,726,433 gal., of which 3328 gal. were produced in New Brunswick. This is equivalent to 420,755 bbl. and at an average price of $1.33 per barrel, was valued at $559,604. The total bounty paid in 1909 was $220,896. While the production of petroleum has been falling off, the receipts from natural gas sold have been increasing. The producing gas wells are located in the counties of Welland, Haldimand, Norfolk, Kent, Essex, and Bruce in Ontario, and at Medicine Hat and vicinity in Alberta. The total receipts from gas sold in 1909 were about $1,205,943, the figures representing, with one or two exceptions, the total values paid by the consumers. The quantity of gas sold or used during the year was over 6,000,000 M. ft. Of the total value about 95 per cent. is to be credited to Ontario.

Salt

Complete returns of salt production received show total sales of 84,037 tons, valued at $415,219 for the salt alone. Stock on hand at the end of the year was reported as 2671 tons; 185 men were employed, and $96,116 paid in wages.

Portland Cement

Complete statistics have been received from all but two cement manufacturers in 1909. These, however, will not increase the totals by more than 2 or 3 per cent. Subject to this correction, the total quantity of cement made during the year was 4,089,191 bbl. as compared with 3,495,961 in 1908, an increase of 593,230 bbl., or 17 per cent. The total quantity of Canadian portland cement sold during the year was 4,010,180 bbl., as compared with 2,665,289 in 1908, an increase of 1,344,891 bbl., or 50 per cent. The total consumption of portland cement in 1909, including Canadian and imported cement, was 4,152,374 bbl., as compared with 3,134,338 in 1908, an increase of 1,018,036 bbl., or 32 per cent.

The average price per barrel at the works in 1909 was $1.31 as compared with $1.39 in 1908. The imports of portland cement into Canada during the 12 months ending Dec. 31, 1909, were 497,678 cwt., equivalent to 142,194 bbl. The duty is 12½c. per 100 lb. As there is very little cement exported from Canada, the consumption is practically represented by the Canadian sales together with the imports. An estimate of the Canadian consumption of portland cement for the past five years shows that it increased from 2,285,240 bbl. in 1905 to 4,152,374 in 1909. In the five years the Canadian production increased from 1,346,548 to 4,010,180 bbl., while there was a decrease from 918,701 to 142,194 bbl. in the imports.

Zinc Ore in Virginia

Special Correspondence

During 1909 considerable work, mainly in the nature of prospecting, was done by the Virginia Mining and Milling Company on the Osborn property situated in Russell county, on Copper creek about 10 miles south of Castlewood, a station on the Norfolk & Western railroad.

The existence of zinc-lead ore at this point has been known for some years, and several parties worked there in a small way, on lease, before the present company took hold. The zinc ore is now mainly calamine, with a little carbonate and occasional traces of sulphide. The lead is galena, and occurs in contact with the zinc. The ore that has been found is fairly rich, but its occurrence is irregular, consisting of small stringers or veinlets through the creviced limestone, or as lumps in sandy pockets of small extent. No regular vein has been encountered, and no concentrated material similar to the well known formation at the Austinville mines.

The workings consist of a tunnel extending about 100 ft. into the hillside, from which three levels have been driven right and left, a distance of about 50 ft., and in these several shallow trial pits were sunk. Most of this work was done some years ago, the present operators having merely reopened and cleaned up, and in so doing obtained about 150 tons of ore. A carload of this ore was shipped recently to the spelter furnaces of the Bertha Mineral Company, at Pulaski, and is said to have averaged over 40 per cent. metal.

Operations of the Doe Run Lead Company

A 2000-ton Concentrating Plant Recently Completed. Producer Gas Engines and Electric Generators Replace Steam. Compressed Air Haulage

BY ALBERT H. FAY

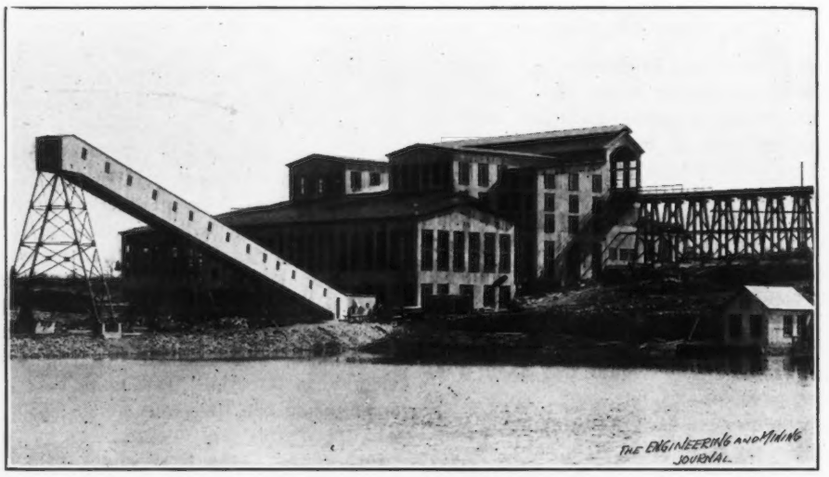
The mining operations of the Doe Run Lead Company, Flat River, Mo., are carried on through shafts Nos. 1 and 4 at Flat River; Nos. 2 and 3 at Central, about ¼ mile west of Flat River; Nos. 9 and 11 at Esther, 2 miles east of Flat River; No. 6 at Elvins, 1 mile south; and No. 8 at Mitchell. The milling operations consist of the Columbia 600-ton mill at Esther; the Doe Run mill at Doe Run, 900 tons; and the Elvins mill of 2000 tons capacity. About 1400 men are employed at all the plants, divided as follows: 200 at Esther; 1000 at Central, and 200 at Doe Run. The proportion of mine to mill labor is about three to one. The company maintains offices at Doe Run, Central and Bonne Terre, Missouri.

Mining

The lead occurs disseminated in limestone strata which are approximately horizontal. The upper strata are quite strong and tough, giving an excellent roof so that no timbering is required. The orebody varies in thickness from 10 to 30 or 40 ft., and the work is carried on by running drifts about 30 ft. wide. Pillars 10 to 12 ft. in diameter are left with centers approximately 40 ft. apart. When running a drift, a heading is usually carried forward in the upper part of the ore. This is kept two or three rounds (15 to 20 ft.) in advance of the lower part of the face. The remainder of the face is then taken out in benches 8 to 10 ft. deep until the bottom is reached. In this way the face of the drift has a slope of about 45 deg. Piston air drills are used and 8- to 10-ft. holes are drilled. A large portion of the drill steel is sharpened underground,and it is only the actual repair work that is done at the surface shop.

The water is pumped by centrifugal pumps direct connected to electric motors. At shaft No. 4 is the largest pumping plant which consists of three five-stage centrifugal pumps each having a capacity of 750 gal. per minute. These are operated by 150-h.p. motors. Under normal conditions, only one pump is required to handle the water at this shaft. The other two are held in reserve to be used in case of an emergency. It frequently happens that a cave is encountered which sends in a large quantity of water on short notice, hence the necessity for keeping the pumps installed at the various shafts.

A large amount of the underground haulage is done in 1-ton cars with mule power. Little hand tramming is done. Two 25-h.p. H. K. Porter compressed-air locomotives were recently installed at shafts Nos. 4 and 1. These are operated under a pressure of 800 lb., although constructed to operate with 1000 lb. pressure. The track upon which these locomotives will run is laid with 20-lb. rails. Mules will still be used to gather the cars from the working faces and bring them to a point where they may be picked up in trains of eight or ten cars and taken to the shaft with the locomotives. This haul will be approximately ⅛ of a mile, although this is subject to a wide variation. The cars are hoisted on a balanced cage. Compressed-air haulage is also used at the St. Joseph mines at Bonne Terre.



Elvins Mill, Doe Run Lead Company, Southeast Missouri

Preliminary Crushing

As the ore comes from the mine it is dumped on a metal picking belt. Here a portion of the coarse waste material is taken out by hand. The ore from the belt goes to a 6-in. grizzly, where larger pieces are broken by hand hammers until they pass through. All the ore passes through a No. 5 McCully gyratory crusher and is broken to about two-inch size. It is then elevated to railroad cars and taken to the mill.

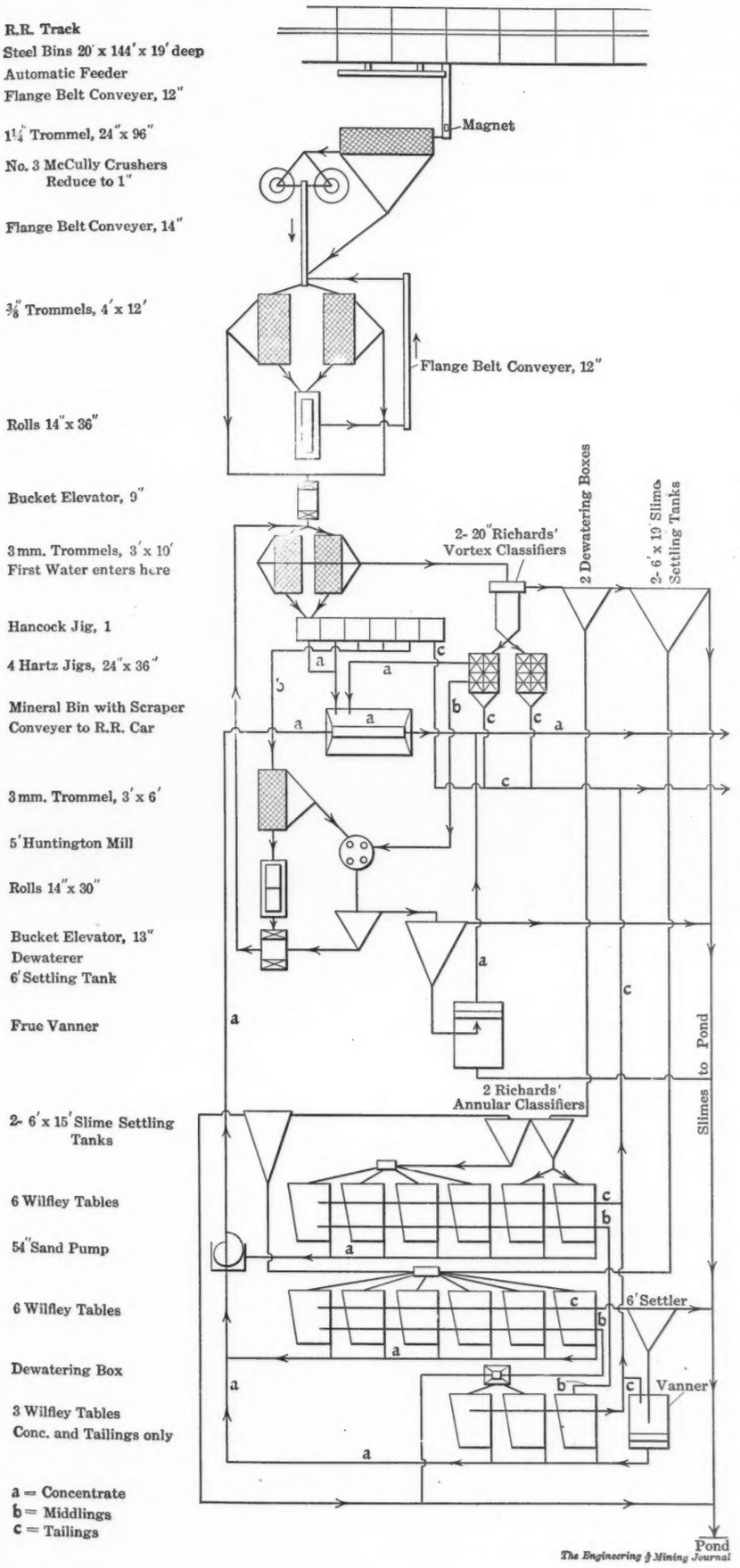
The Elvins 2000-ton Mill

The new Elvins plant of the Doe Run Lead Company has a capacity of 2000 tons per day and is built in four units of 500 tons each. The mill is shown in an accompanying illustration. Any one or all of the units may be operated as required. The building is constructed of steel throughout, with corrugated-iron siding. All the floors are reinforced concrete, supported by steel girders. The size of the building is as follows: Crusher floor, 88x144 ft.; jig floor, 45x144 ft.; table floor, 48x208 ft. The entire width of the building is 181 ft. and the total area is approximately one acre. The steel ore bin is 20x144 ft., and 19 ft. deep; with a standard-gage railroad track on top. The mill is heated by three Baltz hot-air heaters, one in the basement, two on the crushing floor.

All the water for the new mill is pumped from a reservoir in Flat river. Two 150-h.p. motors operate two 2-stage, 10-in., vertically mounted turbine pumps each having a capacity of 2000 gal. per minute under a head of 175 ft. The pipe line is 14 in. in diameter and about 1 mile long. Just above the mill is a large reservoir 150 ft. square, 12 ft. deep, built in the clay soil on a limestone bedrock, from which the water runs by gravity to the mill. A large percentage of the water from the mill, after passing through the dewatering screen goes to a settling pond from which it is pumped to the above reservoir by two single-stage centrifugal pumps, each operated with a 75-h.p. motor.

Milling

The accompanying flow sheet gives the system of milling in detail. One special feature of the mill is that the crushing is done dry. No water is added until after the ore passes the second set of rolls, where water and ore both enter


R.R. Track
Steel Bins 20' x 144' x 19' deep
Automatic Feeder
Flange Belt Conveyer, 12"
1¼" Trommel, 24" x 96"
No. 3 McCully Crushers Reduce to 1"
Flange Belt Conveyer, 14"
⅜" Trommels, 4' x 12'
Rolls 14" x 36"
Bucket Elevator, 9"
3 mm. Trommels, 3' x 10' First Water enters here
Hancock Jig, 1
4 Hartz Jigs, 24" x 36"
Mineral Bin with Scraper Conveyer to R.R. Car
3 mm. Trommel, 3' x 6'
5' Huntington Mill
Rolls 14" x 30"
Bucket Elevator, 13"
Dewaterer
6' Settling Tank
Frue Vanner
2- 6' x 15' Slime Settling Tanks
6 Wilfley Tables
54" Sand Pump
6 Wilfley Tables
Dewatering Box
3 Wilfley Tables Conc. and Tailings only
a = Concentrate
b = Middlings
c = Tailings
Magnet
Flange Belt Conveyer, 12"
2- 20" Richards' Vortex Classifiers
2 Dewatering Boxes
2- 6' x 19' Slime Settling Tanks
2 Richards' Annular Classifiers
Slimes to Pond
6' Settler
Vanner
Pond
The Engineering & Mining Journal

FLOW SHEET OF ONE SECTION OF THE ELVINS MILL, DOE RUN LEAD COMPANY

the third set of trommels. These trommels are 3x10 ft. with 3-mm. screens. The fine material from this trommel passes through a Richards classifier from which slimes go to the Wifley tables independent of the Hancock jig. The removal of all the slimes at this point is another feature of this mill. The 3-mm. sand is sent to Harz jig while the coarse material from 3 to 9 mm. is treated on a Hancock jig. The Hancock jig produces heads from two cells, middlings from three and tailings from one. The Harz jig produces heads from the first two cells, middlings from the second and tailings from the overflow.

The middlings from the Hancock jig pass through a 3-mm. trommel from which the oversize goes to a pair of 14x 30-in. rolls and by bucket elevator to the trommel in front of the jigs. All the 3-mm. size goes through a Huntington mill to a dewaterer. The spigot producer is drawn off to the elevator and goes back to the trommel in front of the Hancock jig. The overflow passes to a 6-ft. V-shaped settling box from which the overflow goes to the slime pond, and the spigot product to a Frue vanner. In this way all the middlings are crushed to pass a 3-mm. screen and then enter the Harz jig and slime-treatment system.

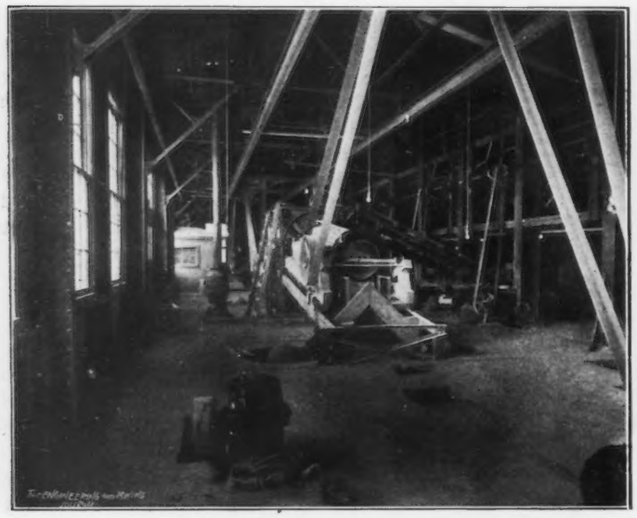
TREATMENT OF SLIME

Just in front of the Harz jig are two 20-in. Richards vortex classifiers, the overflow from which passes to two dewatering boxes; the spigot product passes to the Harz jigs. The spigot product from the dewatering boxes goes to two Richards annular classifiers which produce three products distributed on Wilfley tables as shown in the flow sheet. The overflow from the dewatering boxes passes to two 6x10-ft. V-shaped settling tanks, the spigot product from which goes to Wilfley tables as shown, and the overflow to the slimes pond. The overflow from the annular classifiers also passes through two settling boxes before it reaches the slime pond. Twelve of the tables produce, heads, middlings and tailings. The tailings from the first six tables pass off as waste. Those from the second six to a 6-ft. settling box, yielding a spigot product for the Frue vanner. The middlings from the first six tables go to a single Wilfley table which yields heads and tailings, and the middlings from the second six pass through a classifier and thence to two Wilfley tables yielding heads and tailings.

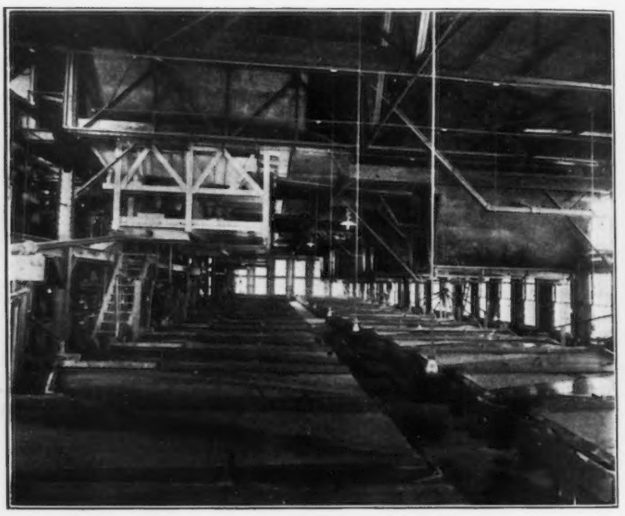
All the lead concentrates are collected in a V-shaped bin, with a scraper conveyer in the bottom which elevates the concentrates to a hopper above the water level of the bin, from where the concentrates are taken by a similar conveyer to the car for shipment. The tailings are conducted to a dewatering screen then to a 20-in. belt conveyer which runs lengthwise of the mill, on the lower side,

with a speed of 280 ft. per min. The waste material is transferred from this belt to a second 20-in. belt which runs at a speed of 350 ft. per min. and delivers the tailings on top of the tailings pile. This belt with its housing is shown in the foreground of the photograph showing the mill. From here the tailings are distributed by water, in launders, although some other system will be installed later, possibly an aërial tram.

The labor in the mill is reduced to a minimum. All the ore is handled mechanically. About 20 men per shift are required when the mill is running at full capacity. The mill is neat, well constructed and is the result of long experience in the milling of lead ores of southeast Missouri. It was built under the direction of O. M. Bilharz, consulting engineer to the Doe Run Company and to whom I am indebted for much of the above information.



FEED FLOOR FOR GYRATORY CRUSHERS, ELVINS MILL



WILFLEY TABLE FLOOR, WITH CLASSIFIERS ABOVE

SMELTERY AT HERCULANEUM

All the concentrate from the Doe Run mills, as well as from the St. Joseph mills at Bonne Terre and Leadwood, are sent to Herculaneum to be smelted. The lead smeltery has been practically rebuilt during the last two years. The plant now has three blast furnaces, 48x160 in., each having a capacity of 250 tons per 24 hours. There are also two of the old furnaces, 48x100 in., in which retort dross and some matte are smelted. The Savelsberg process is being used for roasting lead ore and 29 pots are in use. These have replaced a large number of calcining furnaces. Only five of the reverberatory calcining furnaces are now in use and these will be abandoned as soon as 10 more roasting pots or other roasting facilities are installed.

Each pot has a capacity of 10,000 to 12,000 lb. per charge; two charges are run per 24 hours. Each cast-iron pot is 8 ft. in diameter, in the form of a hemisphere. The air for blowing is admitted at the bottom. The top of the pot is covered by a hood, which carries off the sulphur fumes. The pot is mounted on trunnions, so that when the charge is finished it can be revolved and the contents dumped on the floor, where it is broken by hand hammers and shoveled to a metal link-belt conveyer. In charging the pot a small coal fire is made in the bottom and then lead concentrates are shoveled in by hand, just enough to cover the fire. As soon as this is heated to redness another thin layer is added, so that at all times the surface of the charge is black, while less than an inch beneath it is at red heat. The feeding continues gradually in this way until the pot is full and the entire mass roasted. After it is all roasted, 20-oz. air pressure is turned on for a short time to convert the roasted ore into a high-grade matte.

Arrangements have been made recently to install two units of the Dwight-Lloyd sintering machines. Each unit is 42x264 in., and has a capacity of 95 tons per day. This installation is intended to do the same work that is now done by the Savelsberg pots.

GAS GENERATING PLANT

The Loomis-Pettibone system of gas generation is used and consists of four units of 1000 horsepower each. Each unit has two generators of 500 horsepower each. The generators are constructed of iron and steel, and are lined with firebrick. The feed floor is above the generators. All the gases from the generators pass through a multi-tubular boiler thus producing steam which in turn is directed into the fires for decomposition. This method of using the heat of the gases increases the efficiency of the plant materially.

The gas after passing through the boiler goes to a wet scrubber which is built of steel cylinders in which are trays covered with coke. The gas enters at the bottom of the cylinder through water, passes up through the layers of coke upon which water is sprayed. Enough steam is generated in this scrubber to run the engine which operates a positive type of exhaust. The exhaust produces sufficient vacuum on the fires to give a down draft and pressure enough to deliver the gas to the holders.

From the wet scruber the gas passes through a dry scrubber which is made of shavings or excelsior inclosed in a sheet-iron cylinder. Two of these dry scrubbers are used intermittently. The storage tank has a capacity of 30,000 cu.ft. The fuel used is soft coal from Ilinois, and the plant produces one horsepower from 0.7 to 0.8 lb. of coal.

THE CENTRAL STATION

A central station has been completed recently, in which electricity is to supplant steam as a motive power. The engine room occupies a floor space of 157x70 ft. The building is structural steel covered with corrugated sheet iron. The floors throughout are made of concrete. In this engine room are four 4-cylinder, 24x36-in., cross-compound, 800-h.p. Snow gas engines direct connected with Westinghouse generators. The speed of the engine is 107 r.p.m. The four generators are alternating-current machines of the following type: 550 kw., 6600 volts, three phase, 60 cycle. There are two 100-h.p. engines direct connected to a 75-kw. dynamo operating at 85 to 125 volts used as exciters for the large generators. Only one of these is used at a time. Both are shown in the accompanying photograph.

The St. Joseph Lead Company, of Bonne Terre, Mo., has recently completed

the installation of a producer-gas power plant which is a duplicate of the one described above.

The Gas Engine

The power cylinders of the large engines are provided with combustion chambers on the side, carrying inlet valves and gears on top, with exhaust valves and gear below. This construction is one of the distinct features and makes it possible to keep the center line of the engine down and have all valve gears above the floor which allows access to all moving parts of the cylinders. This also makes it possible to construct the foundation as one solid block under the entire length of the two power cylinders, which are placed in tandem, instead of having the foundation blocks broken up into a number of small piers, as is the case when the exhaust valve and gear are at the lowest point of the cylinder. Piping for air and gas can be partly carried in the continuous bed plate under the power end and, therefore, be made less unsightly and complicated.

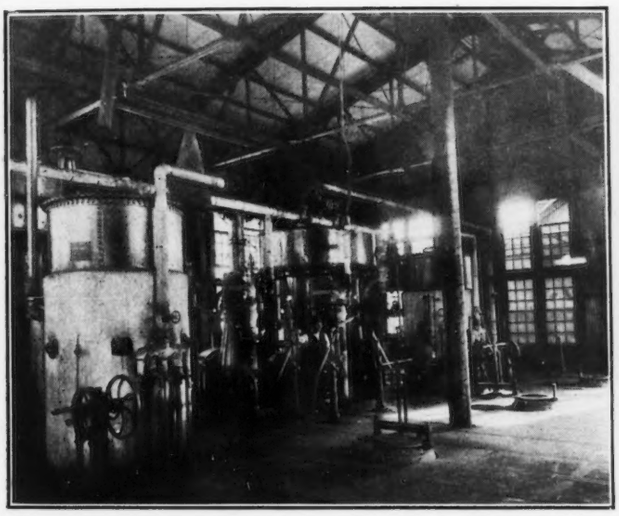
The valve gear consists of a single lever operated by a cam. Another distinct feature of this engine is the cutoff gear admitting gas and air to the main inlet valve. The governor on this engine is driven direct from the cam shaft. The cutoff shaft is driven positively from the cam shaft by the intermission of a hunting gear, the position of which is regulated by the governor lever. This gear transmits the motion from the cam shaft to the cutoff shaft which serves all cutoff valves.

The main inlet valve is operated by a lever from the cam shaft and from the top of its stem operates the air and gas cutoff valve, situated in a chamber cast on the side of the main inlet-valve casing. This is done by means of a simple floating lever and latch lifting the cutoff valve stem until the latch is disengaged from the cutoff valve stem. This movement is subject to the influence of the governor. The gas and air valves are closed by the action of the spring on the stem. A dashpot serves to seat them gently.

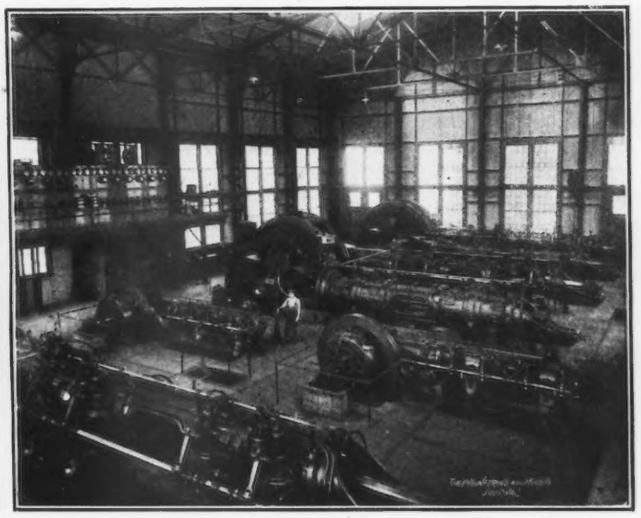
The igniters on these engines are of the mechanical make-and-break type and operate by tappet rods and cams on the cam shaft which cause the moving electrode to come into contact with the stationary ones during a short part of the stroke. Current is furnished from a battery of cells and stepped up to low voltage by means of a spark coil for each igniter. Telltales on these igniter-spark coils serve to detect any defects in the operation of the spark, being under easy observation by the operator and situated so that he can instantly go to the igniter. which is not operating satisfactorily. This igniter system is subject to less wear and repairs than magnetos of high or low voltage type. Three of these engines have also been installed by the St. Joseph Lead Company, at Bonne Terre.

Transmission System

The switchboard contains 13 panels, two for the exciters, four for the generators, two for the feeders, and five which distribute the current to the various working centers. The three-wire system is used. At the end of each line is a brick transformer vault in which the current is reduced to 440 volts, at which voltage it is delivered to the various motors. The longest transmission line is 3½ miles and the total mileage is 9½ miles. All of the electrical equipment, with the exception of five small motors for pumping, aggregating 85 h.p., is of Westinghouse make.



Loomis-Pettibone Producer-gas Plant. Charging Doors in Floor in Foreground



Power Plant Showing Three 800-horsepower Snow Gas Engines

Newfoundland Iron Ore in the United States

The Wabana ore workings, located on a small island in Conception bay, on the northeast coast of Newfoundland, have been shippers to furnaces in this country for a considerable period, though in some years only to the extent of one or two cargoes; during 1906, 1907 and 1908 the average was about 85,000 tons per year, practically all by the Nova Scotia Steel and Coal Company, represented in this country by Pilling & Crane, of Philadelphia. During the last year, according to the *Iron Trade Review,* the partial completion of important development work made it possible to increase the output materially, with the result that sales of approximately 200,000 tons were concluded, partly on a basis of 7c. per unit, duty paid, at seaboard, and later during the year at a slightly higher figure. For 1910 delivery, about 300,000 tons have been sold, the general price being 7½c. per unit at seaboard, duty paid.

The most interesting feature of these workings is the fact that they are largely submarine, drifts following the principal ore vein several thousand feet beyond the shore line. Recent tests show that the deposits increase in thickness and maintain their grade from the shore outward.

The ore, which averages well over 50 per cent. iron, is trammed two miles across the island to the loading piers, which are operated by gravity and admit of remarkable speed. The presence or danger of ice prevents shipments during about four months of the year. The ore is handled chiefly in vessels operating under time charters and the average freight to Philadelphia during the last season was 70 to 80c. per ton.

Commercial Sodium and Potassium Cyanide

Relative Merits Shown by Chemical Analyses. Errors Due to Incorrect Standards. Advantage for Sodium Cyanide with Increased Base Price

BY W. J. SHARWOOD*

Referring to the article on "Spurious Commercial Cyanide," by F. A. Ross, in the JOURNAL Oct. 23, 1909, calls to my attention the relative merits of cyanide containing as a base either potassium, sodium, or a mixture of the two, and to the confusion of ideas resulting from the common method of stating the analyses of the commercial salt. Dr. Russell W. Moore in 1902 published a long series of analyses[1] showing the wide range of variation in commercial potassium cyanide previously imported. Several others have communicated similar results, so that the existence of such variations is well known. The experiences which have been reported from time to time on the practical use of different classes of cyanide have been contradictory and lead to no definite conclusions. In the present instance two shipments of cyanide, apparently of almost identical composition, differed materially in efficiency, which would seem to indicate a new phase of the question.

The manufacture of cyanide is an industry in which an increased demand has encouraged the exploitation of new methods and new sources of supply, resulting in an enormously increased production and ultimate lowering of price, as well as improvement in the product. At present the commercial material contains three to four times the former percentage of cyanogen, and is obtainable at less than half the former price. In other words, one can now buy in the United States about eight times as much cyanogen, for a given sum, as could be bought before the introduction of the cyanide process for gold extraction.

Several years ago much of the cyanide sold contained as low at 12 per cent. CN, the alkali metal combined with it being almost exclusively potassium. With this were large proportions of carbonate and more or less cyanate, etc. Such a mixture would be reported as about 30 per cent. KCN, which no doubt was correct, an ideal "C. P." material being 100 per cent. KCN. Gradually the percentage of cyanogen was raised by the elimination of impurities, and a further increase was secured by the replacement of part of the potassium by sodium, the latter having a much lower atomic weight, but, so far as known, having no prejudicial effect. The relative cheapness of sodium compounds, and the constantly increasing demand for potassium in agriculture stimulated this substitution. The practice of valuing the commercial cyanide in terms of KCN has still been adhered to, in spite of occasional protests that the percentage of actual cyanogen afforded a more rational standard.

Absolutely pure KCN contains 39.95 per cent. CN, while pure NaCN contains 53.05 per cent.; 26.04 parts of cyanogen being combined in the one case with 39.15 parts of potassium, and in the other with 23.05 parts of sodium. For most purposes these percentages may be taken as 40 and 53 respectively. On this difference in percentage depend most of the complications which occasionally lead to misunderstanding. For by the above system of valuation a sample of pure sodium cyanide, containing no trace of potassium, would be rated as

$$\frac{53.05 \times 100}{39.95} = 132.8$$

per cent. KCN; while a mixture of exactly 3 parts sodium cyanide with one part of sodium chloride or sodium carbonate would be reported as 99.6 per cent. KCN. In this way the replacement of potassium by the lighter atom of sodium may cover up the presence of fully 25 per cent. of impurities in the commercial salt, the latter being still reported in the ordinary analysis as nearly 100 per cent. This is, of course, generally known, but there is a possibility of still further complication when a separate determination of sodium and potassium cyanides is called for.

REPORTING CHEMICAL ANALYSES

The analyses quoted by Mr. Ross deserve a little attention as an instance of such a complication. Being so nearly identical we may take the mean, which gives: KCN, 15.75 per cent.; NaCN, 82.30, and SO_3, 0.15, or a total of 98.20 per cent. Now if this is to be taken precisely at its face value the impurities cannot exceed 2 per cent., and we have:

	Per Cent.
CN in KCN $= 0.3995 \times 15.75$ per cent. $=$	6.3
CN in NaCN $= 0.5305 \times 82.3$ per cent. $=$	43.66
Total CN $=$	49.66

A material which contains practically 50 per cent. of actual CN would no doubt be sold as "125 per cent. KCN," while the samples appear to have been of the "98 to 100 per cent." class. It is probable, therefore, that the analyst reporting these results has adhered to the usual method of reporting the sodium cyanide in terms of its equivalent of KCN. Interpreting it on this assumption with NaCN equivalent to 82.3 per cent. KCN, we have:

	Per Cent.
CN in KCN $= 0.3995 \times 15.75 =$	6.3
CN in NaCN $= 0.3995 \times 82.3 =$	32.9
Total per cent. CN $=$	39.2

A sample containing 39.2 per cent. of actual CN would ordinarily be reported as

$$\frac{39.2}{0.3995} = 98.1$$

per cent., potassium cyanide, and presumably this mixed cyanide was sold on this basis. If we recast the analysis on this supposition, and consider the SO_3 as combined with sodium, the items become:

	Per Cent.
Actual KCN	15.75
Actual NaCN $= \frac{32.9}{0.5305} =$	62.0
Na_2SO_4	0.27
Total accounted for	78.02
Not accounted for	21.98
Total	100.00

That there is no inherent objection to a mixture of this nature is obvious from the fact that one of the two shipments of this composition was found entirely satisfactory. The explanation of the difference in the behavior of the two lots is probably to be sought in the character of the supposedly inert ingredients which make up the deficiency in the analysis.

The analyst is not altogether to blame for reporting results in this way. If he were to state the results in such a way that the total alkaline cyanide summed up to less than 78 per cent., some of his clients would no doubt protest that they were not getting the 98 or 100 per. cent. cyanide they were paying for. The cyanide man using the salt would have to recalculate the analysis to the KCN basis, in order to know how much to use in making up his solutions. It would seem desirable for the analyst to state exactly what he means, when such an ambiguity exists as in the present instance. Thus the original analysis might be stated:

	Per Cent.
Actual KCN	15.75
NaCN in terms of KCN	82.3
Total cyanide in terms of KCN	98.05

The principal objection to the last system of stating the results is that, like the first, it conceals the undetermined deficit in the percentage composition; which, in

*Homestake Mining Company, Lead, South Dakota.

[1] "Composition of Commercial Cyanide of Potassium," *Journ.* Soc. Chem. Ind., Mar. 31, 1902; Vol. 21, p. 321.

this instance, appears to be about 22 per cent.

Incorrect Standard

But the fundamental absurdity consists in reporting the valuable constituent of a substance in terms of an arbitrary and incorrectly used unit. The system is so thoroughly established, and so convenient for some practical purposes, that most people will no doubt continue to use it.

The conventional method of reporting the results of a cyanide analysis, in which the alkali metals have been determined, is first to consider the potassium and cyanogen, and combine them so far as possible. Any residual cyanogen is then calculated as combined with sodium. The remaining sodium, if any, is either ignored or is calculated as combined with any other acid radicals (SO_4, CO_3, etc.) which have been determined.

A report showing the percentages of actually determined potassium, sodium and cyanogen, without attempting to combine them, is in many ways preferable. This strictly logical and scientific method of stating analyses does not appear to find favor for most technical purposes, such as water analyses, where engineers prefer to have the bases and acids combined at NaCl, $CaSO_4$, etc. Similar absurdities are perpetrated and perpetuated in many industries, largely on account of the inconvenience of changing an established standard.

The actual estimation of sodium and potassium in cyanide presents little difficulty, if the percentages of the two are not too unequal. The cyanides are converted into chlorides and weighed, after which the chlorine is titrated by silver nitrate; if the ratio Na : K is beyond certain limits, say 1 : 4 and 4 : 1, errors in manipulation are multiplied disproportionately in the calculations.

Comparison of NaCN and KCN

Mr. Ross raises the question as to the relative advantage of the cyanide represented by the analysis just discussed, as compared with a brand containing actually 100 per cent. NaCN, when the latter costs about 4.53c. more per pound. An accurate comparison requires a knowledge of the actual price as well as the difference in price, but for the present purpose we may consider the cheaper material at two distinct valuations, say 18c. and 25c. per pound. The commercially pure sodium cyanide may be taken as containing 50 per cent. CN, equivalent to about 125 per cent. KCN, against 39.2 per cent. CN found for the mixed salt under consideration. Compared on the basis of the cyanogen contents we have the cost in cents per pound of cyanogen:

		Cents per Lb.
(1) Mixed cyanide, at 18c.	÷0.392 =	45.92
Sodium cyanide, at 22.53c.	÷0.50 =	45.06
(2) Mixed cyanide, at 25c.	÷0.392 =	63.77
Sodium cyanide, at 29.53c.	÷0.50 =	59.06

For a fixed difference in price per pound the advantage of the sodium cyanide therefore increases with an increase in the base price, and similarly with an increase in freight and other constant charges, provided its contained cyanogen can be safely assumed to be as efficient as that in the mixed or potassium salt. As to this point a remarkable diversity of opinion exists.

On a working scale the experience of Mr. Oxnam and many others in Mexico and elsewhere, points to the conclusion that the cyanogen in sodium cyanide is at least as efficient as that of potassium cyanide or the more common mixed salt. On the other hand Mr. Holbrook at three different plants, and Mr. Magenau, indicate a serious falling off in efficiency when the mixed "98 per cent." cyanide was replaced by the commercial sodium salt. Two other experienced metallurgists have to my knowledge arrived at the latter conclusion after extensive tests on a large scale. Some years ago S. J. McCormick[2] stated that a very impure potassium cyanide, obtained in Brazil and probably containing carbonates, gave much better extractions than a nearly pure consignment. No good explanation of these discrepancies seems to have been found.

In some instances it seems possible that fluctuations in the character of the ores treated may have prejudiced an otherwise fair comparison. As an instance where admixed impurities may affect a comparison we may suppose a plant to have been consuming, say, 1000 lb. of mixed cyanide per day containing about 40 per cent. CN and about 20 per cent. of some foreign salt, for example sodium carbonate. In place of this a change is made to approximately pure sodium cyanide (50 per cent. CN) of which 800 lb. is used per day. The operator, who has been incidentally and perhaps unconsciously dumping daily 200 lb. of sodium carbonate into his solutions, suddenly ceases to make this addition, and it is not surprising that some change in the alkalinity may follow, which, with an ore requiring careful neutralization, may have a perceptible or even pronounced effect upon extraction. The influence of an increase of 1/10 per cent. of sulphide may be equally marked if no precautions are taken to counteract it. Instead of an inert diluent, such as sodium chloride or sulphate, we have on the one hand a mixture of these with a small percentage of a detrimental constituent such as the sulphide, or on the other hand a carbonate supplying a certain amount of protective alkalinity. These are suggested as offering a plausible explanation of some of the reported discrepancies. Fuller details of the conditions of comparative tests of sodium and mixed cyanide are desirable, especially regarding the character of the ore and the impurities in the cyanide used.

In the solutions used in electroplating, which are fairly concentrated, sodium is stated to exert an injurious influence owing to the relative insolubility of sodium aurous cyanide, which may coat the anode and retard its dissolution. But it is difficult to conceive of this condition affecting results in the weak solutions used in treating ores, as generally speaking the reactions of sodium and potassium salts are identical in dilute solutions. Laboratory experiments also appear to indicate no superiority for potassium salts over those of sodium for the present purpose.

Messrs. Johnson and Matthey, quoted by Lawrie, state that in laboratory tests "with solutions of exactly similar strengths" (presumably in cyanogen) the extractions of gold were about six per cent. to eight per cent. better with sodium cyanide than with the mixed salt, and that "the tailings were much more readily washed." My own experience in tests on a laboratory scale agrees with those communicated by several other experimenters, in obtaining nearly identical results with the two classes of cyanide. The following results were obtained in one series of tests.

A sample of so-called "New Cyanide," which is simply commercial sodium cyanide, showed by analysis fully 50 per cent. of cyanogen, equivalent to 125 per cent. potassium cyanide. Samples taken from various boxes in recent shipments of the mixed cyanide previously used, had ranged from 38.4 to 41 per cent. cyanogen, or 96 to 102 per cent. potassium cyanide, the average being equivalent to 99 per cent. Therefore four pounds of the "New Cyanide" contained a trifle more cyanogen than five pounds of the old material. The "New" sample also showed little more than traces of alkaline sulphides, somewhat less than recent shipments of the old.

Parallel tests were made on the two classes of cyanide as follows: Two solutions were made up, one containing four pounds of "New Cyanide" to the ton, the other five pounds of the ordinary cyanide to the ton. Each then contained about 1/10 of one per cent. of cyanogen.

(1) Two parallel samples of slime, carrying $2.25 gold, and 2.0 ounces silver per ton, were treated with double their weight of these solutions for 18 hours. The decomposition of cyanogen was exactly the same in each instance, and the amounts dissolved were:

	"New Cyanide." NaCN.	Mixed Cyanide. KCN + NaCN.
Gold	89.0 per cent.	89.0 per cent.
Silver	76.5 per cent.	75.0 per cent.

(2) Pieces of pure gold foil, exposing equal surfaces of metal, were left in the two solutions for 18 hours, under identical conditions. The weights of gold dissolved were:

[2] *Trans.* Inst. Min. and Met., Vol. 5, p. 125.

	"New Cyanide."	Mixed. Cyanide.
A. From 10 sq.cm.....	5.32 mg.	5.27 mg.
B. From 20 sq.cm.....	11.42 mg.	11.14 mg.

The slight differences in favor of the "New Cyanide" are probably due to the fact that the former contains slightly less alkaline sulphides than the former, though the amount in each case is small. Under the conditions of these tests both are therefore of practically the same dissolving efficiency per unit of cyanogen, and if this held good on a working scale there would be a considerable advantage in favor of the new or sodium cyanide, unless its price were disproportionately high, as only four-fifths of the weight would require to be handled and freighted. This applies both to the net weight and to that of the cases.

In several other similar comparative tests the two varieties of cyanide showed efficiencies differing somewhat more than the above, but in no case did the extractions obtained with these two samples show differences greater than might be attributed to experimental error.

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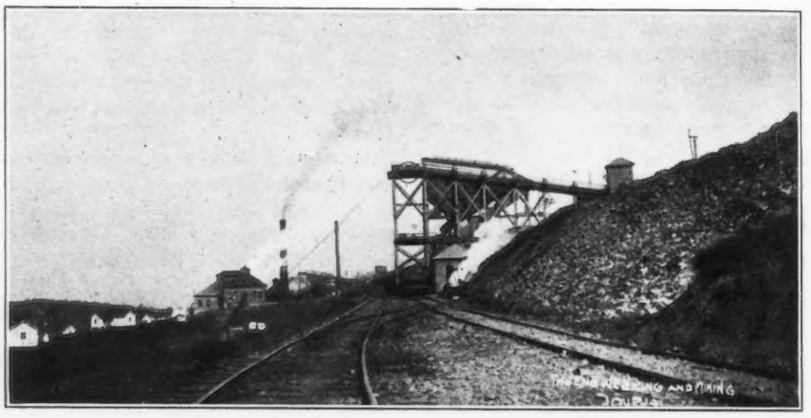
Power Plants at Alabama Iron Mines

The Tennessee Coal, Iron and Railroad Company has erected modern power plants to serve the slopes of its mines on Red mountain, Alabama. These power plants serve one or two slopes as the nature of the situation determines. In the photograph which shows one of the power plants and tipples on the Muscoda division, the power plant serves two tipples, the second one being shown in the background to the right of the stack. The line of idlers, carrying the hoisting cable from the power plant to the tipple in the foreground, may be seen in the photograph. A similar line carries the cable to the other tipple on the other side of the power plant.



POWER PLANT AND TIPPLES ON RED MOUNTAIN, BIRMINGHAM DISTRICT, ALA.

The plant recently installed at the No. 13 slope on the Ishkooda division of the mines on Red mountain is the most modern of those in the district. The general construction of the building is similar to that shown in the accompanying photograph. This plant, however, is equipped with Murphy automatic smokeless stokers, in this particular being ahead of any of the other installations. The hoist is a Nordberg-Corliss, 30x60, first-motion machine with an 8-ft. drum; the compressor is an Allis-Chalmers, 60x48x 42. There are eight boilers of 140 h.p. each, four of which are continually in use. As the boilers are equipped with automatic stokers and also with an automatic ash conveyer, shoveling is completely eliminated.

Gold Mining in Nova Scotia

According to the Halifax *Industrial Advocate*, the production of gold in Nova Scotia in 1909 was 12,500 oz., a slight increase over 1908. The principal producers were the New England Mining Company (formerly the Boston Richardson) at Goldboro, the Oldham Sterling Gold Company at Oldham, the Great Bras D'Or Gold Mining Company at Middle River, Cape Breton, the Ponhook Mining Company at Malaga, and the Sydney Gold Mining Company at Country Harbor. Altogether about 25 mines were in operation, employing a total of 550 men.

During the year the Dominion Mining Company at Tangier changed the plant from steam to hydroelectric, generating the power at the Tangier river, about one mile from the mine. This new plant was completed in October and has since been in operation.

At Middle River, Cape Breton, the Great Bras D'Or Gold Mining Company commenced sinking a shaft on the Lizard lead. At Caribou, a disastrous fire destroyed the mill, power buildings and shaft house at the Lake property. New buildings, however, have been completed and work underground is to be pushed. At Malaga Barrens, the Ponhook Mining Company reopened the old workings on the Main Rabbit vein and installed new equipment.

Metal Losses with Ore of Low Copper Contents

By C. A. Heberlein*

The subject of metal losses in smelting ore containing a small per cent. of copper has been discussed often, but the literature on the subject is far from being complete. Last September, I was called to Balsas, Guerrero, Mex., to blow in the furnace of the Maine & Nebraska Mining Company, to smelt an ore not exceeding 0.3 per cent. copper. I took the utmost pains to get at the actual slag loss for the copper, silver and gold while making what may be termed an iron matte.

Mine and Smeltery

Before entering into the subject, it may be of interest to give a description of the mine and smeltery, which are situated near the town of Balsas, Guerrero, the end station of the Cuernavaca division of the Mexican Central Railroad. Balsas lies almost due south from Mexico City, and the distance by railroad is 293 km. The altitude above sea level is about 1500 ft. The smeltery of the Maine & Nebraska company is connected with the main line by a broad-gage spur, 1½ miles in length.

The mine is reported to be well developed. The orebodies are opened by crosscut tunnels and the ore is delivered to the smeltery from the lowest tunnel. The smeltery equipment is of the usual type. The dimensions of the furnace are 36x120 in. at the tuyeres; the hight of the shaft above the tuyeres to the feed floor is 7 ft. An overflow trap spout was provided; also a circular brick-lined settler 6 ft. inside diameter. With a mud-lined swing spout the matte is tapped into sand beds, in which it is readily broken up and shipped to a custom smeltery. As the ore is hard and coarse, the hight of the furnace did not prove sufficient to allow hard driving, which the ore demanded in order to make a high concentration. In regular running the blast pressure did not exceed 18 ounces.

In testing the ore with the magnet I found it strongly magnetic. The mine-run of ore, as intended to be smelted, is a mixture of phyrrhotite, small quantities of chalcopyrite mixed with a calcite and shale gangue. A carefully taken grab sample gave the following analysis: SiO_2, 31.4 per cent.; Fe, 20.1; Al_2O_3, 5.6; S, 11.7; CaO, 14.6; and Cu, 0.28 per cent.

Furnace Experiments

The furnace was blown in on this ore without the further addition of fluxes, using 10 per cent. Agujita coke, which contained 16 per cent. ash and 81 per cent. fixed carbon. Until the furnace settled down to regular work, the slag was highly silicious and rather cold; with increased blast it became hot within a short time and the concentration of ore into matte was 10:1. After 24 hours I was able to reduce the coke gradually from 10 per cent. to 7 per cent. The blower delivered 6300 cu.ft. of free air per minute and the consumption per ton of ore was 56,000 cu.ft., with an average capacity of 160 tons per 24 hours, or 5.3 tons per sq.ft. of hearth area.

The above ore, I was told, did not represent exactly what the mine could produce and undoubtedly with a little sorting a better grade could have been made; but at the time of blowing in, room had to be made and it was decided to smelt the ore, in preference to sorting.

Determining Metal Losses

To determine the metal losses I took extreme care to protect the granulated slag sample against any salting. The composition of the slag turned out as calculated. The following is an analysis: SiO_2, 45.4 per cent.; FeO, 22.2; CaO, 22; Al_2O_3, 8.6; Cu, 0.086; Ag, 0.0035 kg. per ton, and Au, 0.2 gram. The matte from a concentration of 8:1 at that time, gave; Cu, 2.20 per cent.; Fe, 64.10; S, 27.50; Zn, 0.60; As, Sb, and Bi, *nil;* Ag, 0.391 kg. per ton, and Au, 30 grams. The losses in the slag with above concentration were: Cu, 21.5 per cent.; Ag, 7; Au, 6; total loss, 0.68 peso per ton of ore.

The second sampling, when the furnace ran at its best and concentrating at a rate of 10:1 with a coke consumption of 7 per cent., gave slightly different results. The slag ran: SiO_2, 45.60 per cent.; FeO, 23.88; CaO, 21.48; Cu, 0.095; Ag, 0.065 kg. per ton, and Au, trace.

I attempted several times to determine the gold with crucible charges as high as 100 grams, adding leaf silver for collector, but was unable to obtain more than a trace. Undoubtedly, at the time of this sampling, the furnace was running on some poor ore as the resulting matte showed the concentration of the copper but not of the silver and gold: Cu, 3.08 per cent.; Ag, 0.335 kg. per ton, and Au, 30 grams. The slag losses from the corresponding dump sample were: Cu, 23.7 per cent.; Ag, 13; Au, 3.3; total loss 0.739 peso per ton of ore.

Unfortunately I did not have an opportunity to run the same class of ore with higher gold and silver contents to collect a wider range of data. Enough can be learned from these data to show that only a small amount of copper is sufficient to produce a fair extraction of the silver, and a still better of the gold. If the furnace had been higher, the concentration would have gone up with the pressure of the blast; in this case the charge was entirely too open, and a burden of at least 10 to 12 ft. would have been necessary to obtain the right pressure, as at no time was the furnace lacking the necessary quantity of air.

The jackets were constructed without any bosh or inclination and the consumption of jacket water was tremendous; after running 5 days, I am informed, the consumption remained high, while usually after 12 hours it commences to decrease. I was informed that the furnace was specially designed to produce high concentration with great fuel economy. With higher sulphur and iron contents most likely the coke could be reduced materially, but with such a shallow shaft and narrow tuyere space as in this case, a concentrated smelting focus could not be expected.

Much trouble was experienced from the corroding action of the matte; the water-jacketed cast-iron spouts did not last at all, and I noticed that a heavy copper ring in the breast plate burned away within a few hours. A sectional, water-cooled cast-iron spout, lined inside with chrome brick, I believe would withstand the action of this matte.

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Manufacture of Alumina

An improvement in the manufacture of alumina, that is applicable to any process in which the alumina is precipitated from a solution of aluminate by carbon dioxide was patented (U. S. Pat. 941,799, Nov. 30, 1909) by Gilbert McCulloch, of East St. Louis, Ill., and assigned to the Aluminum Company of America, Niagara Falls, N. Y.

Mr. McCulloch's process is as follows: A liquor of approximately the proportions Al_2O_3, 75 to 80 grams per liter; Na_2CO_3, 40 to 50 grams; Na_2O combined with Al_2O_3, reckoned as NaOH, 105 to 115 grams; SiO_2, 0.15 to 0.25 gram, is placed in an agitator which is preferably a long, cylindrical steel tank. The liquor is then stirred by paddles, and carbon dioxide passed over it, which reacts with the sodium aluminate, forming Na_2CO_3 and aluminum hydrate, until the alumina present in solution has been reduced to 5 to 10 grams per liter. The composition of the liquor is now about Al_2O_3, 5 to 15 grams per liter; Na_2O combined with Al_2O_3 and reckoned as NaOH, 10 to 20 grams; SiO_2, 0.10 to 0.20 gram; Na_2CO_3, 185 to 195 grams.

Silica, as well as alumina, is precipitated by the carbon dioxide, but not in the same ratio. From the silica content of the liquor, it can be determined just when to stop the precipitation to obtain any desired degree of purity from the silica. The separation of the alumina and silica is the important feature of the process.

The Arteaga Mining District, Chihuahua, Mex.

SPECIAL CORRESPONDENCE

Probably one of the least known and at the same time oldest districts, in the point of producing mines, in northern Mexico is that portion of the Arteaga district lying adjacent to the town of Chinipas, in the southwestern part of the state of Chihuahua. Inaccessibility and higher transportation cost have been the causes of this district being neglected by the prospector, but since the completion of the Southern Pacific branch line to Alamos there has been a steadily increasing interest displayed in the mines and prospects of the entire district. One may now come from San Francisco to Alamos by rail in about 40 hours, from Alamos to San Bernardo by stage in 7 hours, and thence to Chinipas by mule back in about 12 hours.

The district is still dependent upon the faithful pack mule and burro. The capacity of these means of transportation is illustrated by the fact that a 12-mile narrow-gage railroad, 20-ton locomotives, has been operated for about 20 years between the mine and mill of the Palmarejo and Mexican Goldfield, Ltd., near Chinipas, to say nothing of the other mills throughout the district, all of which were packed in on mule back.

The Palmarejo Mine

Probably the most important mine of the district, and one of the great mines of Mexico, is the Palmarejo with a record of steady production of about 110 years. This mine has been controlled by an English company for about 20 years and it is this company that built the mentioned railroad, also a 14-mile masonry ditch supplying the 50-stamp mill with power. It is understood that this company is now about to install a new mill of 300 tons daily capacity, the process to include fine grinding in tube mills, agitation with cyanide and filtering.

The ores of the Palmarejo, and in fact of all the mines of the district, consist of a highly silicious matrix carrying from ½ to 2 per cent. concentrates (iron sulphides). Argentite and free gold occur in proportions varying from 0.05 oz. gold with 10 oz. silver, to 1 oz. gold with 40 oz. silver.

The ore occurrence in the Palmarejo is in shoots and lenses of pay ore within an immense vein of low-grade stuff. The vein proper is 50 to 150 ft. between well defined walls, and within this vein occur the oreshoots. The mine is worked through a series of tunnels on the vein, the lowest being 700 ft. below the croppings. It may be said of all the vein systems of the district that wherever opened up they have proved to be strong and continuous; in one instance the vein system may be traced on the surface for considerably over two miles. The veins for the most part are perpendicular or nearly so.

Among the other producing mines of the district are the properties of the White Chief Mining and Milling Company, the Rio Plata Mining Company, and the Durazno-Tetamoa Mines Company. On a number of promising prospects development work is being pushed and more producers should soon be added to the ranks.

White Chief Mine and Mill

The properties of the White Chief Mining and Milling Company cover a system of five parallel veins occurring along the fracture planes of an immense diabase intrusion through a granite country. This diabase dike has a width of about 200 ft., with a strike north and south, and within it and more or less parallel are the five veins. The most important, inasmuch as it has been more developed, is the Guadalupe vein, on which is a working shaft 350 ft. deep, equipped with an 8x12 duplex direct-connected steam hoist, and with levels at each 100 ft. In this vein the ore occurrence is characteristic of the district, the pay ore occurring in shoots and lenses within the vein. The vein has been supplying the 15-stamp mill for 10 years with ore ranging from $8 to $20 per ton. Baby and hammer drills are used throughout the mine. In all the veins of the district are frequent occurrences of small shoots of high-grade or bonanza ore which is shipped direct to the smelteries. This ore runs from $200 to $3000 per ton.

At the mill of the White Chief the ore is delivered from the mine by a 1⅛-mile, 24-in. narrow-gage tramway to an upper ore bin, thence through a 7x9 Blake crusher to 1-in. ring, then to the stamps, through 30-mesh, No. 28 wire cloth, over 8-ft. copper plates where from 40 to 60 per cent. of the gold and silver are amalgamated, making a bullion of about 534 gold and 420 silver. The pulp then passes through a Pierce amalgamator to cone sizer, thence to Wilfley tables, the tails from which are sized into sands and slimes, the sands going to 20-ton leaching tanks where they are given from 3 to 4 days' leaching with a 5-lb. solution of NaCN. At present a gross extraction of 80 per cent. is being made, but with the addition of a slime plant this should be increased to about 93 per cent. The concentrates and precipitates are shipped to San Francisco, but it is the intention to cyanide the concentrates. Mining, milling and overhead charges at present average about 8 pesos per ton.

Chinipas and Surrounding Country

Rio Plata and Other Companies

The Rio Plata company has been operating a 100-ton plant at its mines near Guazapares for the last three years on a high-grade silver ore. It has just completed the installation of a new hydroelectric power plant and a cyanide plant, including Pachuca tanks, for the retreatment of the tailings. It is claimed

that the mill has been running on 100-oz. silver ore from its start, and the accumulated tailings are said to carry about 80 ounces.

The Durazno mines, about 12 miles from Chinipas, have been taken over by the Durazno-Tetamoa Mines Company, which has installed a 50-ton mill. These mines are among the producers, although they have been handicapped for lack of water due to the general drought which prevailed last year. These are old mines with a record of large production. The occurrence and character of the ore are typical of the district.

Of the old mines probably the Millonaria is the most picturesque. This mine was owned by the king of Spain and is credited with many millions of

MASONRY DITCH IN ARTEAGA DISTRICT

production. It is at present about to be opened by American capital. There are also many antiguas now being taken hold of and reopened, while others still offer opportunities to the prospector and investor.

Price of Radium

A recent consular report states that the work of determining the radium content of the Joachimsthal ores has been begun at the Vienna institute, and that the radium will be sold in vials, each to contain 60 mg. of 5 per cent. radium or 30 mg. of 10 per cent. radium. The price of such a vial will be 1080 crowns (about $216), or on the basis of a price of 300,000 crowns ($60,000) per gram for pure radium. At present the demand from institutes and medical clinics is in excess of the supply.

Reverberatory vs. Blast Furnace*

By Henry F. Collins†

Besides being a valuable record of practice in a particular locality, Mr. Ricketts' paper on reverberatory practice at Cananea, brings up the general question of the blast furnace against the reverberatory, and it might be worth while to refer briefly to some of the principal factors which might affect a decision as between the reverberatory and the blast furnace.

There are two principal factors which affect the problem, and several subordinate ones. The two principal factors are the size of the particles of ore, and the relative cost of coal as compared with coke. Subordinate factors are water supply, the cost of refractory material, and the regularity of the ore supplies.

It is well known that a blast furnace lends itself much better than the reverberatory to intermittent and more or less variable ore supplies. In order to do cheap work on a large scale the reverberatory requires regular supplies of material of uniform quality, whereas a blast furnace can be started up today, shut down tomorrow and restarted next week without any difficulty, and with very slight additional expense.

With regard to water supply there are parts of South America and of Australia where water is so scarce that the use of water jackets is practically out of the question, and blast-furnace work without water jackets is, of course, for large-scale work impracticable. In such cases, provided fuel can be obtained, the reverberatory is most suitable.

Size of the Ore

Coming to the two principal factors which influence a decision on the problem—the size of the particles and the comparative price of coal and coke—of course with lump ore every one would prefer the blast furnace. If one had jig concentrates or natural smalls, the bulk of which was from ⅛ in. upward, with a certain proportion of grains between ⅜ and ½ in., I think the practice of blast-roasting followed by blast-furnace smelting has much to recommend it.

Blast roasting, where the material is suitable, has several well-marked advantages over ordinary roasting: it is cheaper; it produces less flue dust; it turns out a product which is in a better physical condition for the blast furnace. It is not only in better physical or mechanical condition, but in a better chemical condition, since fluxing has already begun. The sintered mass has already made a partial combination of the base with the silica and it requires fewer units of heat to remelt a slag once formed than to form it from its chemical constituents. Therefore, when the bulk of the material to be roasted is over ⅛ in., with some ¼ in., so that it is porous enough to become evenly roasted and sintered throughout, there is no doubt that blast roasting followed by the blast furnace is the cheapest method.

Where blast roasting fails is in treating table concentrates. In America, and elsewhere, attempts have been made to treat table concentrates by blast roasting, but the product is irregular and great difficulties were found through the formation of craters or blowholes. Such fine material appears to be only adapted to plain roasting in the ordinary automatic furnaces.

Fine, roasted material which is not agglomerated will not serve for the blast furnace; therefore it has to be briquetted first. Preparation for the blast furnace then comprised two processes: Plain roasting followed by briquetting, which combination would necessarily be more expensive than the preparation for the reverberatory. When one has a fine material, like table concentrates, such as nearly all the great plants in southwestern United States have to deal with, one must seriously consider the reverberatory as offering, over the blast furnace, other things being equal, a probability of cheaper smelting.

Coal and Coke Costs

The other great factor, which affects the comparative cost of smelting by the rival methods, is the relative cost of coal and coke. In blast-furnace smelting, leaving out of account any heat one might obtain from the sulphur, it requires from 10 to 12 per cent. of fuel; in reverberatory smelting from 22 to about 33 per cent. It is perfectly plain that when coal is more than half the price of coke the reverberatory is practically outclassed on the ground of economy.

If, as in a case in Spain, coke costs about £2 per ton, and good reverberatory coal costs from 25s. to 30s., it is obvious that the reverberatory, which uses more than double the dead weight of fuel required by the blast furnace, cannot compete.

But with the cost of coal not more than one-half that of coke, it is quite probable that the reverberatory could compete with the blast furnace; and, as Mr. Ricketts observed, there are many places in the southwestern United States and northern Mexico where it is probable that the use of the reverberatory for treating fine material would continue to extend, leaving for blast-furnace treatment a relative smaller tonnage, but of coarser material, for which it is better adapted.

*Discussion of L. D. Ricketts' paper, "Reverberatory Practice at Cananea," read before the Institution of Mining and Metallurgy.

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Gold in The Adirondacks

Last year witnessed a revival of interest in the alleged gold-bearing sands of the Adirondacks. The State geologist, John M. Clarke, has been called upon frequently for information on the subject, as well as for an expression of opinion regarding certain enterprises which have been inaugurated for the purpose of working such deposits on a commercial basis. The exact methods for the recovery of the gold have usually been kept secret and out of the reach of scientific inquiry. The metallurgical process rather than the mines themselves seems to be the principal consideration in the organization of these ventures. There have been many attempts to "promote" a gold-mining industry in this region.

In a recent report, Mr. Clarke states that "the thoroughness with which the prospector has covered the ground is to be seen in the abandoned pits and diggings that are scattered over the section. In 1898 alone nearly 4000 claims were filed for gold and silver discoveries in the State, mainly in the Adirondack region. The basis of all this activity is the alluvial and glacial sands, which occur in almost every stream valley. The sands consist entirely of the minerals of the country formation, which are chiefly granite, syenites, gabbros, and gneissoid rocks of ancient origin. These contain a small proportion of heavy minerals like garnet, hornblende and magnetite, which have sometimes been separated by water action into distinct layers and which are found as black sands along the shores of the Adirondack lakes.

"It is in these heavier concentrated portions of the sand that gold should be found if present anywhere in the region. Assays by reputable firms have occasionally shown a small quantity of gold, ranging from a mere trace to perhaps $1 per ton. The examination of innumerable samples under the microscope has failed to reveal any of the precious metals, though of course such evidence is not conclusive as to their absence or presence. On the other hand the claim has often been put forth that the common quartz sands in certain places carry from $2 to $20 per ton, which, if true, would under ordinary circumstances bring them into the zone of practical exploitation.

"The statement is commonly made by interested parties that the fire assay is unsuited to the determination of gold in the sands, and special analytical methods must be employed."

Is the Fire Assay Reliable?

The following is a letter sent to the JOURNAL for publication, in which the writer sets forth his views concerning the gold-bearing sands, and the method of assaying them:

"Your attention has doubtless been called to a recent *Bulletin* issued by the State geologist of New York, treating of certain alleged gold deposits situated in this, Lewis, and adjoining counties. Having spent all of last summer examining these deposits and watching the test work being done in the hope of developing a commercial process for saving the gold, it may be that some of my observations and conclusions may be of interest to some of your readers.

"The State geologist gives the origin of the gold-bearing sands as the breaking down of the 'granites, syenites, gabbros and gneissoid rocks of very ancient origin.' This conclusion is undoubtedly correct. There is no evidence to be seen that the sands are of glacial origin.

"The State geologist states that many assayers have found gold in small amounts but discredits the statement that the gold amounts to more than 25c. to $1 per ton because, as he expresses it, 'interested parties' claim that the fire assay is not a reliable guide to the accurate determination of values. I have no doubt but what many of your readers will agree with this statement and it is at this point that these deposits present a most interesting problem in metallurgy. I have made upward of 200 fire assays of sand from Lewis county during the last few months. About half of these assays gave from $1 to $4 per ton. Some large deposits averaged about $3.

Volatilization of Gold?

"I use a combination gasolene furnace, for easy control of heat, and run at the lowest possible temperature and only long enough to get a quiet fusion. In the course of my work I broke the cover to the top of my furnace and replaced it with a 3-in. scorifier, inverted. After a few weeks' use I chanced to pick this scorifier up and found it literally plastered with ruby glass, grains of gold and in places a wash of gold.

"I had been running assays against an amalgamation assay expert and had been totally unable to check; failed to even approximate his results. But if I had recovered the gold in my assays that I found condensed from volatilization, I would have at least approximated his figures. I have demonstrated to my own satisfaction that this gold does volatilize in the fire assay. I will be glad to take this point up with any of your readers who may be interested from a technical point of view.

"I have only repeated the experience which has been gained by every investigator since Professor Chase, professor of chemistry at Cornell 20 years ago, who examined these deposits and reported the fire assay to be unreliable, and the gold of $2 and more per ton not extractable by any known process.

"The certain knowledge of the presence of gold has kept the holders of mineral rights at work until a quarter of a million dollars would no more than cover the cost of the experimental work which has been done in the last 10 or 15 years.

New Plants Installed

"During last year two test plants have been equipped in this vicinity, capable of handling the sand in lots of five or more tons. The results attained by these plants have been so encouraging that it is proposed to erect one or more 100-ton mills the coming spring. A net saving of about $2 per ton is indicated by the preliminary work and tests.

"Chemists and engineers of high standing have been in charge of the recent test work and the present situation is of much interest, when it is considered that the effort is directed toward opening a new goldfield within a few hours of New York City. The most successful work so far done has been along the line of electro-amalgamation and it is to the perfecting of the adaptation of this process to the special conditions here found that the hope of success is based.

"Personally, I suspect that we are dealing with gold in the form of a silicate which is decomposed in the furnace and immediately volatilized. I would like to have the matter presented in such a way as to interest others in working out the question of just what the conditions are. I also find values in the country rock."

B. J. HATMAKER.

Lowville, N. Y., Jan. 19, 1910.

Analysis of Samples

In response to his request for an investigation of these sands and the character of the gold contained therein, we invited Mr. Hatmaker to forward sealed samples to the JOURNAL with the understanding that they were to be analyzed and assayed by reputable analysts in New York. The following is the letter accompanying the samples:

"I am glad, indeed, to act on your suggestion, and forward samples of sand which carries gold not recoverable by the ordinary fire assay.

"The samples marked 'A' are from an immense deposit along the Black river and represent three samples taken 300 ft. apart. These samples gave me, by fire, from $3.59 to $3.80 per ton. The

samples marked 'B' are from a deposit back in the hills which should run around $3. This particular sample was taken by Professor Locke, of the Boston Institute of Technology, and myself. It represents the sand of which Dr. N. S. Kieth, of Philadelphia, has milled several tons and has reported $2.50 to $3 recovery, by amalgamation. My fire assays on this have run $1.50 and $2.75. Professor Locke was unable to get more than a trace.

"We are here dealing with gold disseminated throughout the mass of sand derived from the breaking down of ancient rocks. Is it not possible that we may be dealing with gold in some primary condition or combination, not hitherto recognized? A possible silicate, for example?

"I am sending enough sand for both fire and amalgamation assays and shall greatly appreciate your kindness in letting me know the results of the tests. The question of the existence of gold in paying amounts in these sands is one of great importance and has attracted the attention of a good many engineers during the last 20 years. I hope these samples may lead to such an investigation under the auspices of the JOURNAL as may settle the matter."

B. J. HATMAKER.

Lowville, N. Y., January 28, 1910.

We have had the samples which Mr. Hatmaker sent us assayed in New York and the following are copies of the certificates, together with comments upon the gold contained in the sand:

REPORT BY RICKETTS & BANKS

"The samples of sand marked 'A' and 'B,' received sealed under signature of B. J. Hatmaker, submitted for assay, contain:

	'A'	'B'
"Fire Assay	0.005 oz.	0.005 oz.
"Wet Assay	0.005 oz.	0.005 oz.

gold per ton of 2000 pounds."

"RICKETTS & BANKS.

"New York, March 3, 1910."

REPORT BY A. R. LEDOUX & CO.

The other two samples, also designated by "A" and "B," were submitted to A. R. Ledoux & Co., of New York, and the following is their report:

"The two samples of sand submitted to us on Feb. 1, 1910, marked respectively 'A' and 'B,' and sealed with paper bands, bearing the signature B. J. Hatmaker, have been assayed by the usual fire-assay method, yielding:

"'A'—Gold = 0.0025 oz. per ton = $0.05 per ton.

"'B'—Gold = 0.005 oz. per ton = $0.10 per ton.

"This work was very carefully done, using large assay charges. In view of the statement that these sands are said to contain gold combined with some element or elements, causing the gold to volatilize during the fire-assay process, and that this method is not capable of detecting gold in these sands, we have repeated the assays by a wet method which involves digestion of the finely ground sands with *aqua regia* at a low temperature for a long time, filtering off the acid liquid, evaporating it to small bulk and examining the concentrated solution for gold. By this method we obtained:

"In sample 'A'—Gold, trace.

"In sample 'B'—Gold, 0.003 oz. per ton = $0.06 per ton.

"Supplementing these tests, a portion of each sample was concentrated by panning and the concentrates were examined both with a hand glass and also microscopically. Neither sample showed the presence of any visible gold or of any usual mineral or substance which might possibly carry gold. The concentrates are principally magnetic iron particles mixed with some complex silicates of the garnet family.

"Portions of each sample contained in closed tubes of hard glass were heated in a blast-lamp flame to the melting point of the glass. A quantity of combined water condensed on the cool parts of each tube but neither sample yielded any sublimate of volatile matter whatever.

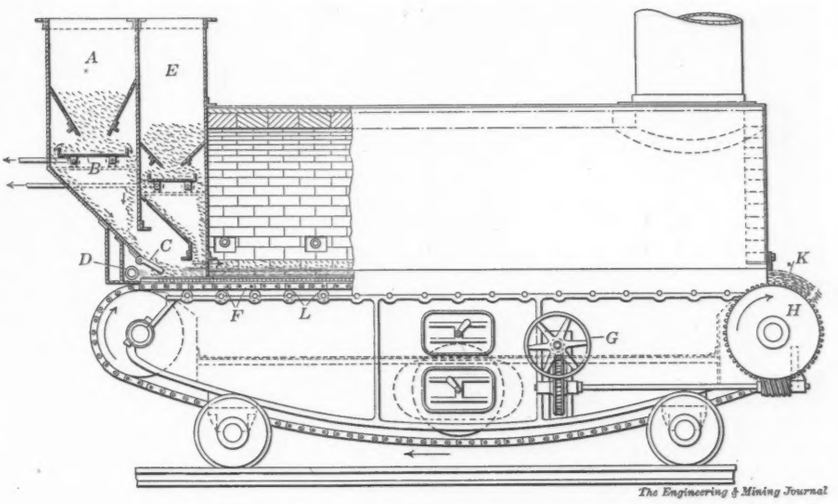
"From the above tests we conclude that these samples are ordinary silicious sands and that they contain only traces of gold as are usually found in such sands. Traces of gold are frequently present in many rocks and sands, and it is not unusual to find gold values equivalent to a few cents per ton in ordinary rocks, such for instance, as granite paving blocks. These samples do not contain any extraordinary or unusual element or any substance which could cause the gold to volatilize in the ordinary process of assaying, nor in fact do they contain any volatile substance except combined water.

"LEDOUX & CO.

"New York, Feb. 21, 1910."

Furnace for Sintering Ore

In United States Pat. 942,052, Dec. 7, 1909, Herman C. Bellinger describes a furnace for continuously sintering or agglomerating fine ores, preparatory to their being smelted. The ore to be sintered is automatically fed over a grizzly to permit the finer particles to drop through the spaces in the grizzly to a traveling carrier or grate, where the finer particles are ignited to form a combustion or priming bed, on which the larger and coarser particles of ore from the grizzly are deposited. On top of the bed, lime, coarse ore or other suitable material is continuously fed to serve as a blanket, this blanket serving to minimize the amount of flue dust created by the forced draft. The traveling grate extends through the blast chamber, and in the course of the travel of the ore sufficient combustion is attained to sinter it, making it ready for the smelting furnace.



SINTERING FURNACE WITH TRAVELING GRATE BARS

Referring to the illustration, which is a side elevation partly in section of the improved furnace, the ore to be treated is delivered into the hopper *A*, having a reciprocating distributing pan *B*, and at the lower end of the inclined chute a grizzly *C*, while beneath it is a burner *D*. Hopper *E* (also fitted with a reciprocating distributing pan) is for the limestone or coarse ore used for the blanket bed, the limestone being delivered at a point somewhat in advance of the end of the ore grizzly. The traveling grate or carrier *F* in the present instance is operated by the pulley *G* and worm gear driving the drum *H*. The sintered product is discharged from the grate at *K*, ready for the blast furnace.

The Advantages of Machine Mining

With a Fair Sized Differential Favoring Machine Mining, the Saving to a Company Will Pay for Machine Plant in One Year's Time

BY FLOYD W. PARSONS

The criminal practice of shooting coal from the solid is being rapidly eliminated, and the more safe and sensible system of first undercutting the seam is becoming general in practically all fields. American coal operators point with pride to the higher efficiency of American mine labor, as compared with European miners. I do not wish to detract from the credit due American workmen; however, it is a fact that the greater output credited American miners is due almost entirely to the more prevalent use of mining machines.

In the State of Ohio, for instance, 82.2 per cent. of the total coal output is machine mined. The average number tons of lump coal mined by each pick miner in Ohio per day is 2.2. In the same State, the average tons of lump coal cut by each machine runner for each day is 29.5; while the average tons of lump coal loaded by each loader per day is 3.8. In European mines, the average quantity of lump coal mined by each miner per day is less than 2 tons. This does not mean that the foreign miner is less efficient, or less industrious, but rather that the mine owner is not as progressive and looks with misgivings on the advent of the mining machine. I do not intend to convey that machines are not used in European mines, but rather that their adoption has been slow and on a small scale.

It will not be many years before each coal-producing State will, by legislation, abolish the practice of shooting from the solid; when this condition prevails, the mining industry in America will have taken a forward step from which there will be no occasion or desire to recede. Aside from the great factor of safety, shooting from the solid is wasteful, in that the coal is shattered and less of the output is commercial.

In discussing the various methods of undercutting a coal seam, I feel that it is unnecessary to compare machine mining with mining by hand, and rather confine the discussion to a comparison of the different types of undercutting machines.

SHOWING FACE OF CHAMBER AFTER BEING UNDERCUT WITH CHAIN MACHINE AND THEN SHOT. IN THIS CASE THE COAL SIMPLY SETTLED AND DID NOT ROLL OUT

VARIOUS METHODS OF UNDERCUTTING

Undercutting by hand is laborious and dangerous, having in its favor, however, the fact that when the coal face is undercut with a pick in the hands of a miner, the undercut is more on the V-shape with the wide end facing out. With this kind of an undercut less powder is required, and the coal being snubbed at the front is more likely to roll out after the face has been shot, thus enabling quicker and easier loading.

There are various kinds of undercutting machines, each having special merits under certain conditions. The selling agent for each style of machine will naturally advance numerous arguments favoring his brand. The mine superintendent, therefore, must study local conditions at his mine carefully so as to be sure that the style of machine adopted will do the work at hand.

In many mines almost any type of machine could be used to advantage; however, a close study of the local situation will generally show that some certain style of cutter is best adapted for the work at this particular mine.

It is probably true that a machine using a cutter chain traveling horizontally across the face of the coal has the largest capacity and consumes the least amount of power. A cutter of this type is commonly known as the chain-breast machine, and is more generally used than any other style of coal cutter. When first introduced, these machines were generally operated by compressed air, but at the present time, electric motors are attached to the cutter-chain machines. The early type of cutter-chain machines was rather defective and inefficient when considered from the viewpoint of present experience. These machines at the present time, however, are stronger and better able to perform hard service with a great-

ly reduced cost of upkeep. As in all cases of mining machinery, the manufacturers have tried to get the maximum of strength with the minimum of weight, for if such a machine is unwieldy and hard to move, considerable time is lost.

Another point of great importance is the amount of space occupied by a machine, for in many mines the roof is of such a character that props have to be placed near to the face of the coal. This factor alone is sufficient to make it impracticable to use certain styles of machines at various mines. If it is possible to secure authentic figures, it is advisable to compare the amount of power used by each machine per cubic inch of coal cut. The machine should be so designed that it can be loaded, unloaded, moved about and pulled out from under the coal by its own power. These machines are usually moved from room to room on a truck, which latter is driven by power from the machine, or is hauled by a mule, depending on whether or not a self-propelling truck is employed. The undercut made by a chain machine is only 5 or 6 in. high, and, therefore, does not permit the coal to fall very far, making it necessary in some cases for the miner to use a bar to pull the coal down and out. If when the cutter-chain machine is used and the face is shot, the coal breaks up and comes out easily, there is then no machine that can equal this type for speed and power efficiency. In such a mine, these machines are not likely to be displaced by any other style of cutter and are in a class of their own. The floor left by the cutter-chain machine is generally smooth and even, making a good bottom for the loader to shovel from.

The first type of chain-breast machine cut the coal "a board" at a time; a later development of the chain machine is designed so that it cuts the coal constantly from the time it is placed in position against the rib until it is withdrawn on the farther side of the room. The speed of these machines across the face of the room varies from 20 to 50 in. per minute, depending upon the hardness of the coal. When the machine is built to cut only a few feet at a time, and then has to back out, be moved and set up ready for the next cut, the progress across the face is much slower, averaging from 5 to 10 in. per minute. However, it must be remembered that the continuous cutter is not adapted for any and all mines.

Where a Mine Has Rolling Bottom

In a mine where a band of sulphur occurs near the bottom of the seam, or where the bottom is rolling, many chain-breast machines will not work satisfactorily. It is claimed by certain manufacturers that their continuous-cutting machines will follow a rolling bottom and maintain a cut parallel to the floor. In many coal seams the bottom of the bed where the undercut is made often contains hard substances, which when encountered by a machine, often cause the bits to break. For this reason it is advisable to seriously consider the flexibility of a machine operating under such conditions. In one type of cutter this difficulty is partly overcome by the use of a friction clutch, which allows the cutting mechanism to slip when hard substances, like sulphur, are suddenly encountered.

Coal-punching Machines

There are many mining men who prefer hand mining to machine mining so far as the character of the undercut is concerned. Undercutting by hand as before stated, is not only more costly, but is attended with considerable danger to the miner and prevents a rapid development of the property. In the face of such conditions, it is only natural that a mining machine would be developed, providing an undercut similar in all respects to that effected by a pick in the hands of a miner.

Until recently, electric power could not be applied as a motive force in the operation of reciprocating percussive tools, or those which strike a blow, such as coal punchers, rock drills, etc. For this reason all of the early types of pick machines were operated by compressed air. The use of steam as a motive power underground is impracticable, in the case of such machines, because of the great losses in transmission and wasteful methods of using. One mining-machinery company went a step further, believing there were numerous advantages in transmitting power by electricity, and succeeded in building a puncher machine which combines air and electricity. The main idea followed out in the construction of this machine was the utilization of air by compression and expansion in the same cylinder. This type of semi-electrical puncher has passed the experimental stage and is now an active competitor of the many different types of air punchers.

In a seam of coal where the bottom is rolly, there is little question but that the puncher type of cutting machine is better adapted, from the fact that in cutting with the puncher machine, the bottom is used as a guide for the puncher pick, and the machine cuts the coal off the bot-

Another View of Face Shown on Opposite Page, After Coal is Undercut with a Puncher and Shot. It Is Evident That in This Seam, a Puncher Machine Is Best Adapted

tom, following rolls and inequalities. In a seam of coal in which the coal is burned to the bottom, the puncher follows the bottom, cutting this coal loose, allowing a smooth surface to load the coal upon, and not making it necessary for the miners to go back and dig up with a pick the coal which is left by the machine.

The Coal Rolls Better

Many advocates of the puncher machine also claim that this type is especially adaptable in coal where the cleats are not well defined, as it allows a condition of shooting which places the coal in such a shape that it is easily loaded. This is brought about by the fact that with the wedge-shaped undercut, only enough powder is required in shooting the coal to break it at the back. When it is shot, the coal readily rolls in such a shape that it can be loaded, and as a result, it does not settle, requiring a great deal of pick work to get it free.

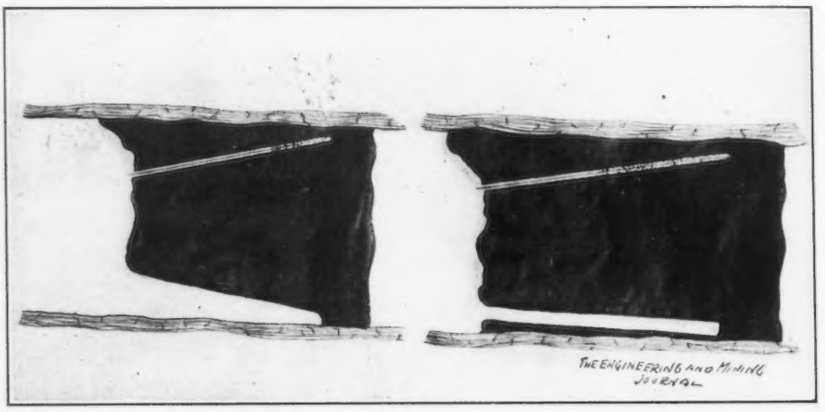
The puncher is more flexible in the nature of its cutting and will work around a sulphur band or sulphur balls, cutting them loose so that they can be removed. Where the top is bad and close timbering is required, the puncher is well adapted, for the cutting board can be placed between the timbers without their removal. In this way, when the puncher is used, timbers can be set within 2 ft. of the face, the only requirement being that the timbers must be placed at least 3 ft. apart across the width of the room.

It is evident from the foregoing discussion that the type of mining machine best adapted for any special mine can only be determined after the most careful investigation. The operator's individual point of view is a matter of supreme importance, for the points of vantage that appeal to one mine superintendent are often ignored by some other manager. At one mine, speed and enlarged output may influence the mine manager to look with favor upon the continuous-cutting electric chain machine, which has been known to produce on an average more than 120 tons per 10-hour shift, in a 6-ft. seam. Another operator is likely to place less stress on speed and capacity, consequently favoring a puncher machine because of the better grade of coal it might get him. As to the power used, electric power is most in favor, although some operators have turned to the use of compressed air purely on the ground of greater safety.

There are still other operators who advocate the use of mixed machines, using chain-cutters in rooms and puncher machines in entries.

Comparison of Cost

It is practically impossible to compare the actual cost of mining with the various types of cutting machines. The machine that would show a considerable saving at one mine might prove inefficient at some other operation. However, when it comes to comparing machine mining with hand mining, there is no difficulty. The most important point to consider is the size of the differential favoring machine mining over hand mining. In many districts this differential, or margin, amounts to about 15c. and it is out of this differential that the operator makes his profit and pays for the plant. At a mine producing 1000 tons per day and having a 15c. margin in favor of machine mining, the gross saving would be $150 a day, or $30,000 per year of 200 days. In such a case, the company can maintain its output with 20 per cent. fewer men than are required when hand mining is employed. It is also a fact that the $30,000 saving will pay for the machine plant, installation and cost of maintenance, as well as interest and depreciation, in about one year's time.



Section Through Coal Face Showing Puncher Cut on Left and Chain Breast Undercut on Right

One of the last States to adopt machine mining on an important scale is Illinois. This condition in Illinois is not due to any lack of desire for the adoption of machines on the part of the operators, but rather to a peculiar attitude of the miners themselves. The general belief has prevailed among the miners that they can show increased earnings when coal is shot from the solid, and they have, therefore, strongly opposed any agreement providing a fair differential in favor of mining machines. In the face of the dangers which are sure to result from solid shooting, and aside from the great waste of commercial coal that results, it is almost unbelievable, but true, that in practically all of the districts in the United States where shooting from the solid still prevails, this dangerous practice is advocated by the miners themselves rather than the operators.

When mining machines were first introduced, the cry was raised by many miners that an effort was being made to introduce mechanical devices that would deprive them of their work. The more thoughtful miners soon came to believe that this view was not only incorrect, but impossible in this age of mechanical progress. Not only have mining machines given more regular employment to an increased number of men, but the clever machine-runner has a better opportunity to increase his daily wage. In numerous cases, machine miners average from $4 to $7 per shift. In addition, the work is done in greater comfort and frequently a day's work is completed in from 4 to 7 hours.

Mining machines are as sure to replace hand mining as the modern fan did furnace ventilation. Our steps along the line of progress have been permanent. There will be no return to hand mining, and so far as shooting from the solid is concerned, that practice before long will only be of interest as a matter of ancient history. Twenty years ago only 6 per cent. of our coal production was machine mined; at the present time, more than 36 per cent. of our total output is undercut by machines. Such facts indicate definitely the trend of the tide.

Mine Timber in the Anthracite Regions

Special Correspondence

A matter of importance that is occupying the attention of colliery proprietors is the growing scarcity of mine props. The timber within reasonable distance of the mines is vanishing at an alarming rate. Reforesting is out of the question on the hills in the anthracite regions, for the soil is of such a poor quality that it would probably take generations to develop timber fit for use; at least this is the opinion of those who have examined the situation. Of course, mine props can and are brought from places far away from the mines, but this involves considerable extra expense. Various substitutes have been suggested, such as steel or iron girders, concrete, etc., but again the question of expense comes in.

Coal-mining Methods in Siberia

Mine Superintendents Must Stand Trial When Fatal Accidents Occur; if Negligence Is Proved, Imprisonment without Option of Fine Results

SPECIAL CORRESPONDENCE

During the last two years Robert M. Percy, a nephew of the late C. M. Percy, the director of the Wigan Mining and Technical School, has been engaged in Siberia developing the collieries owned by the Spassky Copper Mines, Ltd., an English company.

The work undertaken by Mr. Percy in Siberia may be said to be that of the pioneer, and in a paper entitled "Coal Mining in Siberia as carried on by an English company," read before the Lancashire branch of the British Association of colliery managers, he has conveyed his impressions of that vast territory which is generally considered to be a land of prison cells and torture chambers. He says, however, that "the Siberia of convicts and prisons has passed away, and now one only sees indications of industry and peace," Mr. Percy says the Russian Government now realizes what enormous possibilities lie buried in Siberia and all that is necessary to develop the country as a mineral-producing region, is a railway; the capitalist is bound to follow. In the paper we are told that Siberia is a land of promise, and so far as mining is concerned there is every reason to believe that it will one day take a foremost place among the great mineral-producing countries of the world.

The collieries owned by the Spassky Copper Mines, Ltd., are situated at Karagandy, in the Akmolinsk district of Siberia, 600 miles from Petropavlovsk, which is the nearest railway station on the Trans-Siberian railway. Mr. Percy says that so far as the Akmolinsk district is concerned, the extent of the Siberian coalfield has not been fully determined, although it is known that coal does occur in the whole area between Karagandy and Akmolinsk, a distance of 180 miles. The Spassky company's claim at Karagandy is seven miles long and three miles wide. So far, three seams have been met with, although the deepest shaft is only 238 ft. deep. The measures are Upper Carboniferous, and they contain marine limestones, alternating with sandstone, shale and coal.

The three seams so far met with are 4 ft., 7 ft. 6 in., and 28 ft., respectively, but only the latter two have been opened out. The most extensively worked is No. 2 seam known as the Carnot seam. It dips 12 deg. S. E. and the coal is of a semi-bituminous nature, 5 ft. 6 in., thick, with a fairly soft layer of shale, 2 ft. thick at the top.

It also contains several very thin bands of shale near the middle, and consequently the percentage of ash is rather high, ranging from 14 to 20 per cent. The outcrop of this seam can be traced for a distance of 14 miles, to the company's second claim at Saran.

One main shaft (238 ft. deep) and four auxiliary shafts (120 ft. deep) wind coal from the Carnot seam; the main shaft is a rectangular one, 13x7 ft. (overall), and is divided into three compartments, two being used for winding and the other for pumping and ladder-way. The two winding compartments are each 3 ft. 9 in. x 5 ft. 8 in., and are fitted with wooden guides (5x4 in.) secured to the dividing timbers (10x8 in.) by coach screws. Light cages, weighing about ¾ ton are used, and these hold one car containing 9 hundredweight.

A geared compound winding engine is used, the cylinders being 8x13½ in., by 12-in. stroke. A ⅞-in. rope is used on a drum of 4 ft. 6 in. diameter, and the head gear pulleys are also 4 ft. 6 in. diameter. For pumping and winding, power is supplied by two water-tube boilers, one Cornish boiler, and two Russian style boilers.

A fairly large quantity of water is made in the mine, especially at the break of winter, when the snow starts thawing on the surface, and to deal with the water three pumps are installed.

Describing the method of working, Mr. Percy says that levels 12 ft. wide by 7 ft. high are driven east and west from the shaft bottom. At intervals of 100 ft. raises, 12 ft. wide, are driven 200 ft. long and these are connected at the top to form a second level. In this way, pillars 100x200 ft. are formed, but these pillars are again crosscut, so as to form pillars which are eventually extracted. Ribs of coal, 25 ft. thick, are left to support the top and bottom levels, which form the main intake and return airways. The remaining pillars, which are now 100 x150 ft., are eventually taken out.

Every sixth raise is made into a self-acting incline and these convey the coal from the top to the bottom level. The inclines are arranged on the "three-rail" system, with a suitable passing in the middle; to comply with the law, the rails are disconnected from the rails in the bottom levels. The system of working consists in first opening out as quickly as possible on the "room-and-pillar" system and then taking out the pillars thus formed by the "longwall system." The longwall method was tried for opening out, but the results were not satisfactory, since there is not sufficient packing dirt to fill the "gob," and this method was abandoned for the one now obtaining. The pillars are gradually worked off, starting from the top level and working toward the bottom, and the roads are allowed to fall in behind, all timber being recovered. To maintain the inclines, pillars of coal are left on each side, and although an occasional dressing is required, chiefly owing to the floor heaving, they stand well.

The work of development, or in other words, the work of forming the pillars is carried out in winter time; then in the spring, when most of the men leave to return to their villages, the work of taking out the pillars (as nearly as possible in a straight line) is commenced. In this way nearly as much coal is got during summer as during winter although there are 60 per cent. less men employed during the warm months. The coal is mined entirely by pick, and no explosives or mechanical wedges are used. The labor is all unskilled, about 70 per cent. being Kirghiz; there are also Russian and German emigrants and a few Tartars. A Kirghiz collier will average 1¼ tons and a Russian miner 2 tons per day; the coal is not strong and comes away easily.

The timbering is all done by special men, and not by the miner, most of it being done by contract while all retimbering is contract work. The timber used is quite substantial, the props being 7 ft. 6 in. long and from 12 to 16 in. in diameter.

Ventilation Is No Problem

The ventilation question is not a difficult one, since no gas is made in the mine, no fan or furnace being required at present. All the assistance the ventilation needs is given by steam pipes in the upcast shaft, together with the exhaust steam from the pumps. Open lights are used; these consist of candles and small torch lamps which the men provide themselves.

The No. 3 seam, known as the Mariana seam, including dirt bands, is 28 ft. thick, but the full thickness is not worked; the top 8 ft. consists of a poor quality coal and this is left to form the roof. The coal from this mine is hauled up an incline shaft (dipping 1 in 5) by means of a horse whim worked by two horses. At a distance of 100 ft. apart, entries are driven right and left in the bottom 16 ft. of coal, the first level is 300 ft. from the

mouth of the incline. Raises are driven at intervals of 60 ft., thus forming pillars 100 ft. by 60 ft. The coal is worked in a series of steps, both during development and also during the extraction of the pillars, but as the mine is at present only worked on a small scale scarcely any pillars have been removed.

The surface arrangements at the Carnot shaft are of the very simplest nature, the mine wagons being run out of the cage along a gangway to an "end-tipple" fixed 45 ft. from the shaft. The coal falls on to an ordinary "fixed bar" screen placed at an angle of 30 degrees. The round coal falls into 8-ton railway cars while the smalls drop through a hopper into iron side-tipping cars. These are hauled up an incline by horses and the contents tipped on the slack heap. This slack is again screened, by hand, and the nuts are used at the boilers and quarters.

Tact and good feeling are necessary in the laying out and management of the mines, for the Russian law does not recognize a "foreigner," the only responsible person whom the government recognizes being the underlooker or undermanager, who is held directly responsible to the inspector for all work carried out. The law is very severe on accidents and no matter how trivial they are they must be reported in a book provided for that purpose with a signed statement by the doctor as to the nature of the injuries. When a fatal accident occurs the Russian official has to stand for trial at the nearest court, and should negligence be proved on his part he is sentenced to a term of imprisonment without the option of a fine. Having once been subjected to imprisonment he is not allowed to act in any responsible position in the mine again, and he is also barred from holding any other government appointment. As Mr. Percy says, this is certainly severe punishment, but it has the effect of keeping the Russian officials up to the scratch so far as looking after the safety of the mine is concerned; discipline among the men is good, dismissal for misbehavior being rare.

Prevention of Runaway Cars on Inclines

Numerous appliances have been designed to prevent cars running wild down inclines. A recent article in the *Journal* of the British Society of Mining Students, by John Bell, describes a simple plan for arresting runaway cars: A beam of wood, 6 in. square in section, and 18 in. longer than the hight of the road, is fixed to the roof as follows: the upper end is hinged by means of a pin fixed in a crevice in the roof, its other end being free, but ordinarily held up by a bolt and two eyes, this bolt passing through the eye of another pin also fixed in the roof, the bolt being connected to a lever at the inclined head by a strong length of wire. On a double incline road two blocks are necessary, one over the center of each way; on long inclines two sets fixed on each road at distances of one-third and two-thirds of the length of the incline, and worked by the same wire, are preferable, so that if the cars have passed one block before power of control is lost, they may be stopped by the other. As soon as it is obvious that the cars are running wild, the bankhead boy can immediately pull the lever withdrawing the bolt, and so allow the lower end of the beam to drop to the floor and bar the way, so that the cars run against it and are derailed.

Coal Industry in Northern China

By E. Walch*

Among the most important coal mines in China are those of Kaiping at about 150 km. north from Tientsin. They are worked by the Chinese Engineering and Mining Company, Ltd., consisting mainly of French and Belgium capital. The company sank three pits called Tongsham, Noedwestshaft and Linsi, having an aggregate output of 1,200,000 tons in 1908. The market is mainly on the spot, coal being used for the North China railway, or sold in Tongku, Tientsin or Peking. A small part, 187,000 tons in 1907, was exported from Chingwantao to the northern and southern markets. The retail prices quoted at Tientsin range from $8.90 for household coal to $11.50 for double-screened large steam coal; fines are quoted $6.40 to $6.90 and coke from $12 to $18 (Chinese dollars [1]).

In the same district are many Chinese enterprises, among which we may quote the Peayang Lanchow Mining Company working a mine at Shen Cha Lin and producing 100 to 150 tons of poor coal per day.

Outside of the Kaiping enterprise, the most important coal mine in China is that of Lincheng, worked by a Belgium-Chinese company, floated by the Société Anonyme des Mines du Luhan, head office of which is in Brussels. The mines are 350 km. from Peking and 890 km. from Hankow on the Peking-Hankow railroad. The product is long flame coal. At its start, in 1905, the company resumed the Chinese workings. Now its first modern plant is almost completed and fitted with the most uptodate appliances. It includes two shafts, 12 ft. in diameter; one of which is equipped for an output of 2000 tons per day, with a screening plant for 1000 tons in 10 hours. The plant includes air drills, steam underground pumps, electric lights, fans, lamp shop, storehouse, repair shops with a foundry, etc., and eight boilers. The colliery is connected to the Peking-Hankow system. Its principal consumers will be the Peking-Hankow railway, and brick manufactories along the line.

Other Operating Companies

Its competitors are the Ting Cheou mine at 250 km. from Peking, the Feng Lo Tcheng mine at 492 km. from Peking, both Chinese enterprises, and the Peking Syndicate, which works an anthracite coal vein at Wei Huoi Fou, 589 km. from Peking. The Lincheng mines are under the management of a Belgian mining engineer.

Another mining district of future importance is known as the Shansi district. The coal seams surround the Chen-Kia-Choang to Tayuenfou railroad, a branch of the Peking-Hankow system. The only mines worked by modern contrivances are those of Ching-Ching at 13 km. from the railroad to which they are connected by a narrow-gage track. These mines belong to a German syndicate which obtained from the Imperial government a contract made under the same conditions as that of the Société des Mines de Luhan. The capital is 500,000 taels, viz., $300,000 (American). The daily output is 450 to 500 tons. Coal is sold to the Peking-Hankow railway and also in Tientsin.

A great number of local exploitations are found all along the line. For example, about 300,000 lb. of coal are produced daily at Cheou-Iang-Hien and sold at the mine at ½ to 1½ samèques per pound, but the cost of transport to the railway station of Iang-Tsuen, together with the taxes charged on coal transported, bring the price up to about $2 (Chinese) per metric ton d/d f.o.r. Iang Tsuen. The cost price of the same ton d/d Tientsin is $10.50 (Chinese) due to the railway tariff and various duties.

In the North is found another important center at Shangtung, producing two qualities, that of Fangtze and that of Hungshan, with a daily output of 100 tons for the former and 300 tons for the latter, which is mainly sold to the German warships. Selling prices are: Fangtze (Chinese dollars) $8.50 to $9, Hungshan 27 shillings.

In Manchuria, coal is found on the eastern part of the mountains along the Liao valley. The Japanese work now the mines of Fushan, Yentai and Penh-sihu with an increasing output, which was over 1000 tons per day in September, 1908.

The development of coal mining in China is therefore considerable. The local industries are scarce. The consumers are the railways and individuals for household consumption. The demand is increasing steadily.

*Paris, France.

[1] The Chinese dollar is equivalent to about 29 cents.

NEW PUBLICATIONS

CATALOG OF PUBLICATIONS OF THE GEOLOGICAL SURVEY, CANADA. Revised to Jan. 1, 1909. Canada Department of Mines, Geological Survey Branch.

THE GEOLOGY OF THE WHANGAROA SUBDIVISION, by J. M. Bell and E. de C. Clarke. New Zealand Geological Survey, Bulletin No. 8. John Mackay, Government Printer.

THE MERCURY MINERALS FROM TERLINGUA, TEXAS, by W. F. Hillebrand and W. T. Schaller. U. S. Geological Survey, Bulletin 405. Government Printing Office.

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY FOR 1908 WITH SUBJECT INDEX, by John M. Nickles. U. S. Geological Survey, Bulletin 409. Government Printing Office.

THE COAL FIELDS OF MANITOBA, SASKATCHEWAN, ALBERTA AND EASTERN BRITISH COLUMBIA, by D. B. Dowling. Canada Department of Mines, Geological Survey Branch.

ALGUNAS REGIONES PETROLÍFERAS DE MÉXICO, by Juan D. V. Villarello. Boletín del Instituto Geológico de México, No. 26. Imprenta y Fototipia de la Secretaria de Fomento.

REPORT ON THE IRON ORE DEPOSITS ALONG THE OTTAWA (QUEBEC SIDE) AND GATINEAU RIVERS, by Fritz Cirkel. Canada Department of Mines, Mines Branch. Government Printing Bureau.

EL POZO DE PETROLEO DE DOS BOCAS ESTADO DE VERACRUZ, by J. D. Villarello. Parergones del Instituto Geológico de Mexico, Vol. III, No. 1. Imprenta y Fototipia de la Secretaria de Fomento.

REPORT OF THE CHIEF INSPECTOR OF MINES IN INDIA UNDER THE INDIAN MINES ACT (VIII OF 1901) FOR THE YEAR ENDING DECEMBER 31, 1908, by J. R. R. Wilson, Superintendent Government Printing, India.

BIBLIOGRAFIA GEOLOGICA Y MINERA DE LA REPUBLICA MEXICANA COMPLETADA HASTA EL ANO DE 1904, by Rafael Aguilar y Sabtillán. Boletín del Instituto Geológico de México, No. 17, Bibliographia Geologica y Minera de la Republica Mexicana. Imprenta y Fototipia de la Secretaria de Fomento.

LABORATOIRE PORTATIF POUR ESSAIS DES MINERAIS PAR LA VOIE SÈCHE ET NOUVELLE MÉTHODE DE DÉTERMINATION DU POIDS DES BOUTONS D'OR ET D'ARGENT, SANS LE SECOURS DE LA BALANCE, by Adrien Braly. Extract from Bulletin et Comptes Rendus Mensuels de la Société de l'Industrie Minérale, October, 1909.

METAL STATISTICS, 1909. Compiled and published by the American Metal Market Company, New York.

A small and convenient book of reference containing much miscellaneous information on the course of iron and metal prices.

THE GEOLOGY AND ORE DEPOSITS OF GOLDFIELD, NEVADA. By F. L. Ransome, assisted by W. H. Emmons and G. H. Garry. Professional Paper No. 66, U. S. Geol. Surv. Government Printing Office.

The discoveries at Goldfield a few years since roused again the half-romantic interest which was given to the Nevada mining districts, years ago, by the Comstock lode. Ore of almost fabulous richness; the hard conditions of the desert; the high-graders, whose opportunities came from unexpired leases in ground unexpectedly rich; the struggles with lawlessness; all these combined to make an appeal to the imagination, the equal of which has not been experienced since the early days of Cripple Creek.

Now that the geological relations are systematically and clearly set forth, they furnish to the scientific reader matter not less interesting than that which the stirring events of a new mining camp present to the devotee of the sensational. The district is unusual, and reveals to careful study much that is striking and original. It has not been easy to decipher, and both field work and interpretation have evidently been done by keen and accurate observers.

The oldest rocks are Cambrian shales. No Archean gneisses or schists are visible as a foundation; nor do any other Paleozoics appear as successors to the Cambrian. One can only surmise that the Paleozoics were once existent and that they have been washed away. The next rock in time is a binary granite with little else than quartz and fieldspar. Its time of entry is presumptively assigned to the close of the Jurassic or the opening of Cretacic period. Next volcanic activities broke loose in the Eocene and continued through the later Tertiary period. Thirteen or perhaps fourteen distinguishable outbreaks followed one another, with a partial interruption for the deposition of lake beds after No. 10. Even the lake beds were accompanied by a coincident basalt flow. Erosion and the deposition of gravels followed but gave way to eruptive No. 12. More sediments were succeeded by No. 13, a basalt flow, and then erosion brings us to the present. In the series of eruptives there are five rhyolites, three basalts, three andesites, two dacites and one "third-and-third-and-third" rock called latite in that it is part trachyte, part andesite, part basalt. These rocks follow one another in such complicated and repetitional succession that no regular series of chemically related parts of a parent magma, such as was described by von Richthofen, can be made out.

The ore seems to have entered after the lacustrine beds were deposited and to have preceded the gravels above cited. Its probable time of entrance is late Miocene or Pliocene. The vehicle of introduction is believed to have been magmatic waters but it seems impossible to connect the waters positively with any single igneous mass. A dacite, which is largely in the glassy condition and which is placed in the series of thirteen at No. 8, has some claims to consideration because even now it contains about 4 per cent. of water. The magmatic waters are thought to have contained much H_2S and CO_2, possibly also SO_2.

The waters rose through shattered rather than greatly faulted belts in the andesite, dacite and latite. By the impregnation and replacement of these rocks extensive mineralized zones resulted in which occur the much more restricted bodies of ore. The variety of minerals is impressive; 65 are listed, of which 53 are based on good determinations and 12 are doubtful. One new species, goldfieldite, is described. Its formula is believed to be $5CuS(SbBiAs)_2$, $(STe)_3$. The determination was based on 1.2 grams of crushed material, culled out from a mixture, and the new species is not likely to be accepted without question.

The points of particular interest in the mineralogy are the great abundance of potash alum or alunite as a vein mineral, and the presence of bismuth compounds. The gold is almost all native. Silver minerals have been observed, but are not very large factors. Copper may reach several per cent. in the assays.

When the chemistry of ore deposition is to be discussed the potash alum, alunite, is a very important feature. Mr. Ransome rather favors the following: Magmatic waters charged with H_2S and CO_2 rose through the shattered rock to the surface and there became oxidized so that much sulphuric acid resulted. The sulphuric acid either with or without associated rain water percolated downward, and reacted upon the potash feldspars in the rocks so as to yield alunite. It apparently caused or aided the precipitation of the gold contained in the uprising waters and brought about its association with the alunite. The suggestion is in accord with conclusions reached elsewhere and seems to be the most reasonable method of accounting for the mineralogical relations.

The monograph is well printed and illustrated. It contains many details of mines, well shown on colored maps, and on the scientific side many analyses and discussions of the igneous rocks. The senior author and his assistants are to be congratulated upon this creditable contribution.

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Fred T. Williams is in Butte, Mont., on professional business.

Walter Proctor Jenney, of Tonopah, Nev., is visiting New York.

Alfred James, of London, is in New York this week, on his way to Mexico.

John J. Hill has succeeded A. J. King as manager of the South Tigre mine, Sonora, Mexico.

Robert H. Richards has just returned to Boston from a professional trip to New York State.

Henry Francis Lefevre is now in Central America, where he expects to remain for some months.

S. H. Brady has succeeded F. Corkill as superintendent of the Tonopah West End mine, at Tonopah, Nevada.

L. Webster Wickes has removed his office as consulting engineer to 818 Story building, Los Angeles, California.

F. W. Draper has returned from a two years' engagement in the Ural mountains in Russia, and will remain in London a short time before returning to America.

Walter Unzicker has been appointed chief engineer of the ore mines division of the Tennessee Coal, Iron and Railroad Company, with headquarters at Bessemer, Alabama.

J. F. Newsom, professor of mining in Stanford University, has resigned, in order to go into private work. D. M. Folsom, a former Stanford student, has been named as his successor.

Charles F. Shelby has resigned as superintendent of smelting works of the Greene-Cananea Company in Mexico, to take a similar position with the Cerro de Pasco Company, in Peru.

Wilson A. Luce has been appointed assistant general manager of the Ellsworth Collieries Company, at Ellsworth, Penn., effective March 1. The company is a subsidiary of the Lackawanna Steel Company.

Godfrey D. Doveton and P. G. Spilsbury, of the metallurgical staff of Spurr & Cox (Inc.), are working on the cyanide mill of the Virginia & Mexico Mine and Smelter Corporation, at Hostotipaquillo, Jalisco, Mexico.

Dr. Richard Moldenke has returned from a professional trip to Europe. At Berlin he attended a meeting of foundrymen, engineers and foundry foremen of northern Germany, and made an address on American foundry practice.

R. S. Shoemaker, for some time connected with the Pittsburg Steel Company at Monessen, Penn., as electrical engineer, has become assistant consulting engineer of the Algoma Steel Company, Ltd., Sault Ste. Marie, Ontario.

Walter R. Hodge, recently mill superintendent for the Benito Juarez Mines Company at Salinas, San Luis Potosi, Mexico, is now general superintendent for the Duluth-Toroda Mining Company at Bodie, Okanogan county, Washington.

Wm. B. Stoop, formerly of Youngstown, Ohio, has become connected with the Portsmouth Steel Company and is superintending the construction of the new blooming mill and other additions to the company's plant at Portsmouth, Ohio.

F. H. Nickle has resigned his position as engineer for the Pennsylvania Salt Manufacturing Company at Wyandotte, Mich., and will specialize in vacuum evaporating work and salt-plant engineering. Mr. Nickle is associated with the firm of McDonald & Nickle, with headquarters at Detroit, Michigan.

Frank F. Morris has accepted a position in the mining department of the Ingersoll-Rand Drill Company, with headquarters at Pittsburg. He has served as engineer for the United States Coal and Oil Company, Holden, W. Va., and as mining engineer in the Technologic Branch of the United States Geological Survey.

Walter L. McCloy has been appointed general superintendent of the Philadelphia Company and affiliated natural-gas companies, to succeed J. F. Beatty, who remains with the company as consulting superintendent. Mr. McCloy has been with the company 22 years, and has been assistant general superintendent for eight years. J. A. Reed has been appointed assistant general superintendent.

A. J. Bettles has resigned his position with the Utah Copper Company, and will retire from active service, and will devote his time to the management of his private interests. Mr. Bettles was mill manager for the Boston Consolidated for a number of years, and worked out the milling process and designed the mill. He has been in the mining and milling business continuously for 26 years.

OBITUARY

Thomas McK. Laughlin died in Pittsburg, March 11, aged 35 years. He was born in Pittsburg, and for nearly 15 years past had been connected with the Jones & Laughlin Steel Company.

John Wahl, president of the John Wahl Commission Company, died in St. Louis, March 9. He was also president of the German Savings Institution, having been connected with it for 56 years. The John Wahl Commission Company was organized in 1860, and has grown to be one of the largest dealers in lead and spelter in the West.

Richard Coulter Olyphant died at Trenton, N. J., March 4, aged 57 years. He was born at Uniontown, Penn., and as a young man was assistant to his father in the management of the Uniontown furnace, which was among the earliest in this country to use coke as fuel. For nearly 20 years past he had been president and manager of the Trenton Malleable Iron Company.

David P. Cameron, who died at San Francisco, Feb. 24, had been closely identified with the gold-dredging industry since the beginning of this branch of mining in California. He constructed the first bucket-elevator dredge in the Oroville district, built many of the early dredges installed in the Oroville, Yuba, Folsom and Calaveras districts. In 1900, with Frank W. and Maurice E. Griffin, he formed the firm of Griffin & Cameron. In 1902 this firm was incorporated under the name of the Western Engineering & Construction Company. At the time of his death he was vice-president and superintendent of construction for this corporation. Mr. Cameron was actively engaged for years in constructing stamp-mills and milling plants, and he erected many plants in Mexico and South America. He was associated with the Pelton Water Wheel Company, for which company he installed a large number of plants. Later he became identified with the Risdon Iron Works, superintending the construction of a number of the early dredges built by that company. Mr. Cameron was a native of Nova Scotia. His knowledge of the construction of stamp-mills, water-power installations, and placer dredges was unusual.

SOCIETIES and TECHNICAL SCHOOLS

International Congress of Mining, Metallurgy, Applied Mechanics and Practical Geology—The committee of organization gives notice that the meeting will be held at Düsseldorf, Germany, June 19-23. Committees have already been appointed to make all necessary local preparations. Applications for membership in the congress at the end of January, numbered 750, about one-third being from outside of Germany. A large number of valuable papers have been promised for the meeting. Further applications should be sent in as early as possible, addressed to the Arbeitschuss des Internationalen Kongresses, Düsseldorf, 1910, at Jacobistrasse 3-5, Düsseldorf, Germany. Subscriptions should be made payable to the Stahlwerksverband A.-G., Düsseldorf. The subscription is 20 marks for a member and 100 marks for a patron. Several excursions to mines and works in Germany have been arranged in connection with the congress.

EDITORIAL CORRESPONDENCE

REPORTS FROM OUR OWN REPRESENTATIVES ON IMPORTANT EVENTS FROM MANY IMPORTANT MINING CENTERS OF THE WORLD

San Francisco

March 11—The Natomas Consolidated is one of the greatest gold-dredging companies in the world. The capitalization is $25,000,000 and about 20 dredges, some with 13-cu.ft. buckets, are operating at Oroville and others near Folsom along the American river. Bonds to the amount of $5,000,000 are reported to have been placed in London recently. This company not only derives a large profit from gold dredging, but obtains likewise substantial returns by crushing cobbles and boulders and selling the same for ballast and concrete. Three mammoth crushers are said to have a capacity of 1500 tons per day each. Finally the land that has been dredged and is to all appearance worthless, is reclaimed and planted with eucalyptus and fruit trees.

The Western Federation of Miners is taking steps to enforce the California 8-hour law. Recently one of their agents found that the pump men at the Alaska mine near Pike City in Sierra county were working overtime, the day shift 11 hours and the night shift 13 hours. It is said that the manager will be prosecuted.

The suit brought by McNutt *et al.* against John Hays Hammond, John Hobbs and the Tom Reed Gold Mines Company for some of the company stock was decided in favor of the defendants. The Tom Reed mine is near Chloride, Arizona.

The American Mining Congress is to meet in Los Angeles next autumn. The Sierra Madre club of Los Angeles, made up of mining and oil men, has raised funds to send two of its influential members to Washington to assist in the establishment of the Mining Bureau. Doubtless this action is taken partly from the need of revised laws for the proper acquirement and operation of oil lands, now the chief attraction in California, it being desired to have the coöperation of the bureau and the Mining Congress in this matter. At present oil claims are taken up as placers. It is proposed to run a special train for the delegates through the oilfields to familiarize them with the conditions, possibly incidentally hoping that further investment of capital in oil will result.

The Independent Agencies are daily growing stronger from accession to the agencies of new oil companies. It is understood that the oil produced by the Union Oil Company will be pooled with that of the companies in the agencies. The Producers Transportation Company's pipe line is now completed. This line, about 200 miles in length, will carry oil from Bakersfield, Sunset, McKittrick, Midway and Coalinga to Port Harford, thence to be taken by steamers to Panama and elsewhere. The pipe line is reported to have cost $3,500,000 and to have a capacity of 3000 bbl. per day. The operation of the line will probably be under the control of the Union Oil Company which has contracted to act as sales agent of the Independent Agencies for a term of years beginning 1910. This company has tank ships and barges with a total capacity of 466,950 barrels.

Butte

March 12—The walkout of the hoisting engineers came to an end after the operating companies had convinced the engineers that the mines could be operated without their assistance, and the camp has once more resumed its normal aspect. The engineers, while they failed to vote that the walkout be declared at an end, passed a resolution to the effect that any member might be allowed to return to work without incurring the displeasure of the union, and the next day most of the men applied for their old positions. The operating companies have announced that the men who took the places of the former engineers will be retained so long as their services are satisfactory and that the old men will have to wait their turn. The Western Federation of Miners has fined a number of the engineers who were most active during the walkout, and those fines must be paid before the men will be taken into the federation again and allowed to work.

A force of men has recently been put to work on the new furnaces of the Idaho Smelting and Refining Company, and it is thought that the plant will be ready for operation by April 1. It is stated that the capacity of the plant will be increased from 250 tons to 500 tons daily.

Benjamin B. Thayer, president of the Anaconda company, arrived in Butte recently, and will remain until the first of next month, during which time he will make an inspection of the Amalgamated properties. With Mr. Thayer are a number of mining experts who will examine the Butte and other properties in the interests of the proposed copper merger. Among them are J. F. Kemp, professor of geology at Columbia University, Herman Keller, P. L. Foster and Frank Klepetko. The smelteries at Great Falls and Anaconda will be reported upon also, and it is thought that a preliminary report will be made to the stockholders of the Anaconda company at their special meeting to be held at Anaconda on March 23.

The attorney general of Montana has instituted suit against the Republic Coal Company for violating the State law with reference to providing wash rooms and locker rooms for employees. The statute provides that the company must provide a wash room and locker room for employees, to be situated within 800 ft. of the main entrance to the mine.

Denver

March 12—It is estimated that Inland well No. 16, a "gusher" struck last autumn in the Boulder oilfield, is giving off 1,000,000 cu.ft. of gas daily, and that other wells are doing likewise on a smaller scale. Owing to the difficulty, it is said, of separating the oil from the gas and retaining the latter under pressure, it is all going to waste, no effort being made to conserve it. Now, however, it is reported that plans have been made to do this and that the gas will be piped to Boulder and nearby points within 90 days.

Just now there is a decided shortage of ore in the State. This, of course, is partly attributable to the fact that most of the high mines are still in the grasp of winter, with wagon roads, trails and some of the mountain railroads not yet open for traffic, and the operations of the mines (notably in the rugged San Juan region) are confined to the development of ore for shipment as soon as weather conditions will permit. As a result, however, the American Smelting and Refining Company has only four out of its eight furnaces in Leadville working. At Pueblo, of three smelteries taken over by the company, two have been dismantled and abandoned, and the other is running at half capacity. At Denver, the Globe plant is running at half capacity, the Grant has been dismantled and the Argo is being dismantled. The Durango smeltery is running at about capacity. At Salida, out of the four furnaces controlled by the American Metal Company, two are working.

It appears that the powers of the Leadville Light and Power Company are being heavily taxed to

meet the demands from the mines for power, and many of the properties hitherto worked with steam are now electrifying their plants. Among those mentioned as adopting this plan are the New Monarch mines on Little Ellen hill, the Boulder shaft and the St. Louis tunnel in the same neighborhood. Most of the big tunnels are following suit, the first to move in this direction being the Yak. The Garibaldi, at the head of California gulch, has been working machine drills with electricity for nearly two years. Many of the mines in Iowa gulch are also busy stringing wires for the installation of electric plants.

Salt Lake City

March 12—The stack for the Tooele smeltery of the International Smelting and Refining Company was completed on March 1. It is 350 ft. high; the outside diameter at the base is 45 ft., and the inside diameter 36 ft. 6 in. At the top the inside diameter is 25 ft. The wall at the base is 53 in. thick and at the top 13 in., increasing at the flare to 3 ft. 7 in. The steel work on the converter building is in place and the converter stands are on the ground but have not been assembled. Work has been started on the reverberatory building. The power-house installation has been completed, with the exception of one compressor and condensing apparatus. The sampler is practically finished. Since the weather moderated the working forces have been increased and rapid progress has been made on construction during the last few weeks.

The Santaquin power plant, erected by the Knight mining interests, has been completed and connections made to furnish power for the operation of the Tintic properties controlled by the Knights. Owing to the present contract with the Utah County Light and Power Company, the Santaquin plant is now furnishing more power than is required at the properties in operation, and during high-water time the power can be further increased.

In the case of the Silver King Consolidated vs. the Silver King Coalition, the time allowed the latter company to give evidence in support of its account expired March 6; an extension, however, has been granted. This case differs from the usual procedure in that the defense, in accounting, is compelled to give its testimony first. The evidence thus far has been given entirely by the Coalition company.

Frank Daly, foreman of the Silver King Coalition mine, testified for the defendant to the effect that there was some first-class ore, but mostly second-class and waste in the Parson's stope. From the evidence thus far introduced, it appears that the general understanding of shipping ore by the defendant company was ore that was largely or wholly galena, while the carbonate ore and more or less oxidized portions of the orebody were spoken of as second-class or mill ore. The mill ore also included unoxidized ore in the western end of the stope which carried considerable pyrite. The center and eastern end of the stope at present show no traces of ore of this character.

Regarding the cave in December, 1906, Mr. Daly said he was in the stope the day before the cave took place, and also the day it caved. Mr. Daly said he had instructions to shoot down parts of the stope to change the air current. This was some time in 1906, after all work had ceased in the stope and before the suit was begun. They wanted to improve the air in the Bonanza or Skidoo stope on the 1200 level some distance to the southwest. He used dynamite twice, which he said improved the air in the Skidoo stope. He admitted, however, that it was the custom in the mine to use canvas doors in order to change the air.

On cross examination he stated that he had been present in the McGregor ground (St. Louis-Magnolia suit), at the time the bulkhead was being put in for the purpose of concealing the workings in the St. Louis and Magnolia claims. He had been in the ground behind the bulkhead, but did not see it sealed up, nor assist in its construction. Counsel for the defendant protested strenuously against bringing into the present record anything concerning the McGregor bulkhead suit. Another point in dispute was as to whether the pay rolls of the Silver King Coalition could be examined by the plaintiff. The counsel for the Silver King Consolidated claimed that they had a right to see the pay rolls from March, 1902, to June, 1908, during the time ore was being taken from the Parson's stope. Counsel for the defendant finally consented to produce the pay rolls, but with the proviso that the names of miners who would be called as witnesses by the plaintiff be covered while the pay rolls were being examined. Plaintiff's counsel refused to accept such partial offer. As yet the pay rolls have not been produced, and it is possible that the matter will be taken before Judge Marshall for a ruling on this point.

Goldfield

March 11—A general resumption of leasing activities is noticeable in the Goldfield district. Active operation has commenced on a number of properties, negotiations are completed for a number of others to start soon and important strikes have been made on some of the older leases. The Goldfield Merger Mines Company has extended two old leases and has just granted two others for a period of two years, each of the companies being backed by eastern capital; work is about to begin on new leases on the Kendall, Silver Pick and Atlanta ground; H. B. Lind has started three shifts on the old Booth shaft; the Goldfield Annex lease has installed a compressor to push work with power drills; and a new electric hoist has been added to the equipment of the Grizzly Bear lease. The Campbell lease on Black Butte ground follows a shipment of 17 tons with a discovery of further ore shoots. The Gray lease on the Gold Bar is another new shipper.

Two suits brought by John S. Cook & Co. against the Kendall-Goldfield and Sandstorm mining companies in the district court are taken to be preliminary steps toward the merger of the two companies. It is expected that the properties will be sold at auction, the bank bidding them in, finally to be merged as the Sandstorm-Kendall Consolidated Mines Company.

The report of the Combination Fraction to the bullion-tax collector shows a deficit of $2500 for the last quarter of 1909, although 2878 tons were milled. The deficit is explained by the fact that much of the time was spent doing development work on the property.

Scranton, Penn.

March 14—Emissaries of the Philadelphia strikers have been in various parts of the anthracite regions sounding the various locals of the miners' union as to their attitude should they be called upon to enter upon a sympathetic strike. These men have been mostly investigating or intriguing in Northumberland and Schuylkill counties where the more radical and ignorant element among the miners wrok and live. However, the men from Philadelphia were informed in emphatic terms by the leading officers of the union that the miners had an agreement for three years with the operators and that under no circumstances would they break it. They told them that the matter would not be even referred to among the miners at their local meetings, and that it was useless to send further deputations.

Chief Mine Inspector James E. Roderick has issued a circular in which he calls the attention of the mine inspectors to the Act of the Legislature of May 1, 1909, which provides that the employment age for minors inside and outside of the mines shall be 14 years, and that each minor between the ages of 14 and 16 shall deposit with the company a certificate that he is of proper age and that he is able to read and write the English language; that certificate shall be filed in the office of the company for whom the minor works. In the opinion of Mr. Roderick this act makes it incumbent upon the employer to have a complete list of the minor employees who work inside of the mine and also an outside list, and to have these conspicuously displayed where they can be readily seen.

Birmingham, Ala.

March 14—The special meeting of the stockholders of the Southern Iron and Coal Company called for this week in New York to consider the issue of preferred stock to the amount of $1,000,000 additional, or to issue debentures for that amount, the present stockholders to have first chance at the purchase, means much to the Birmingham district. The amount to be raised is to be used as working capital and to meet expenditures for new plants. The Southern company now has has its properties in good shape and in operation, save the new steel rod, wire and nail mills near Gadsden, which will be ready for operation shortly.

The steel make by the Southern Iron and Steel Company at Alabama City, near Gadsden, is being increased more as the open-hearth furnaces are put in operation. The Southern company is accumulating steel to be used in its rod, wire and nail mills which will be ready for operation within a few weeks now. The company is shipping rails steadily from the rolling mills at Bessemer.

During the present year nearly 500 new coke ovens will be constructed, including the by-product plant of the Tennessee Coal, Iron and Railroad Company in the vicinity of Ensley.

Morgantown, W. Va.

March 14—A gas deal involving $4,500,000 was made at Huntingdon on March 9. The property included 100,000 acres of gas land and 500 miles of pipeline, situated in Wayne and Cabell counties near the Ohio river. It was sold to the United Fuel Gas Company by the Columbia Gas and Electric Company. The buyer agreed to continue the wholesale supply of gas to Cincinnati and the seller retained part of its holdings, including the pipe-line into Kentucky from the Big Sandy river.

The New River & Pocahontas Consolidated Coal Company is planning to install in its mines electric coal cutting and haulage and will install a turbo-generator set of 1500 horsepower.

The new Farmington Coal and Coke company has acquired nearly 1000 acres of the Pittsburg seam on Plum run in Marion county, at a cost of about $250 per acre. It is planned to start development soon, as the right of way for a railroad siding was included in the price of the coal land.

Engineers are now busy in the planning of the second track of the Baltimore & Ohio railroad between Fairmont and Connellsville, Penn. This improvement will cost several millions and will include the reduction of the heavy grade between Mt. Braddock and Lemont and the construction of extensive yards at Fairmont for handling the increasing coal shipments.

Cobalt

March 12—During the month of February the ore shipments from the camp aggregated 2281 tons, which is about 226 tons in excess of the January output. This will probably be largely increased in the near future when the power companies are delivering air and electricity. At the present time the whole camp is waiting for power. The coal question is also rather serious as many companies have stopped sending coal to this district. The reason given is that the lack of yardage facilities and the high demurrage charges exacted by the Temiskaming & Northern Ontario railway cuts off any profit there is in the coal. The Mines Power, Ltd., has definitely promised 5000 h.p. for March 15.

Free gold is now reported in Bryce township on the trail between Elk lake and Charlton. This trail was traveled by hundreds of prospectors when going into Gowganda, and the finds are reported within a few hundred feet of it.

Toronto

March 12—D. D. Mann, of Toronto, vice-president of the Canadian Northern Railway, associated with a number of American and Canadian capitalists, has received control of an area of 4368 acres of rich mineral land along the Bear river, B. C., north of Prince Rupert and the main line of the Grand Trunk Pacific. Surveys have been made and preliminary work done showing the land to contain deposits of gold, silver, lead and some copper. It is stated that over $3,000,000 has already been expended on the property. Arrangements are in progress for opening up the area by a railway from Stewart, the head of navigation on the Portland canal, 15 miles along the Bear river, to the farthest limit of the camp. The equipment for the road has been purchased and a smeltery site laid out.

A committee of the Ontario Legislature is investigating the action of the government in disposing of the mining properties of the Gillies Limit, as it is claimed that their sale without sufficient time or opportunity being allowed for examination, resulted in considerable loss to the province. Evidence submitted on March 8, showed that the property now belonging to the Wyandoh Mining Company was sold by the government for $10,500 to J. A. Young and M. J. O'Brien, and shortly afterwards was resold for $330,000 by them.

The "first" shipment of ore from Porcupine was made on March 4 by Timmins Brothers, who sent 6 tons of high-grade ore from the Hollinger property to the School of Mines, Kingston.

E. A. Wallberg, president of the Mines Power Company, which is developing power from the Matebetchouan falls for supplying Cobalt, has gone to the camp to make arrangements with several companies for the delivery of electricity and compressed air. A number of contracts have already been made. The company will have two central stations at the camp for the generation of compressed air, which will be piped to the mines.

London

March 9—If the Prestea Block A mine in West Africa is not a success, it will not be for want of capital. In July, 1909, the capital was increased from £500,000 to £750,000 by the creation of 250,000 new shares, of which 200,000 were sold to Wernher, Beit & Co., at 24s., with an option over 50,000 more at 27s. 6d. This amount of money has not sufficed to complete the scheme of development and new equipment, and now a new issue of 100,000 shares is being made, of which 70,000 will be offered to the shareholders at 27s. 6d., the whole of which has been underwritten for a call of 30,000 shares at 32s. 6d. Provided all the options are exercised, the capital will be £850,000 nominal. The present price of the shares is 32s., so that the actual capital upon which the mine is expected to pay dividends may be taken at about £1,360,000.

The ore reserves on Dec. 31 are given as 500,014 tons, containing 9.96 dwt. per ton, which, assuming a 90 per cent. extraction, may be taken as equivalent to a yield of 38s. per ton.

In 1907 the yield was in round figures, 50s; in 1908, 34.4s.; and in 1909 (seven months), 34s. per ton. The costs in 1907 and 1908 averaged about 35s. During the seven months of 1909 when milling was going on, the costs are officially given at 24s. per ton, but they do not appear to include depreciation of plant, and not being in the form of a profit and loss account, are not altogether comparable with the figures of 1907 and 1908. The new plant now being erected is expected to handle 300,000 tons per annum. With these figures before one, and bearing in mind that on the three principal producing mines in West Africa, the Abosso, Taquah and Ashanti Goldfields, the working costs including depreciation during the last financial year all averaged over 30s. per ton, the valuation placed on the mine today appears unduly optimistic.

A new company, called the Trinidad Oilfields, Ltd., is being formed to acquire oil and other mineral rights in the Guapo and La Brea districts on the island of Trinidad. Three wells have been opened from which oil has been obtained at depths of 712, 672 and 520 ft. respectively. No part of the property is more than six miles from the sea, owing to which advantage a low cost of production is expected. The company hopes to do a large business with the Mexican and South American railways as well as with the neighboring islands.

THE MINING NEWS

REPORTS OF NEW ENTERPRISES NEW MACHINERY· INSTALLATIONS· DEVELOPMENT WORK AND PROPERTY TRANSFERS THE CURRENT HISTORY OF MINING

Alaska

Ketchikan—Preparations are under way to resume operations on the It mine, which has been closed down for the winter. The Mount Andrew has another large shipment of ore in the bunkers at Kasaan bay. W. F. Polson and M. D. Ickis are sinking a shaft on their property near McLeans.

Juneau—The Wylie, Childs and Butterbahl properties at Auk bay, seven miles from Juneau, have been bonded to A. J. Stewart, of Victoria, B. C., who is planning a large amount of development work on them.

Tanana—Winter sluicing has been successfully carried on in the Tanana district. Word to this effect was brought to Seattle by two miners who deposited their winter's clean-up in a local bank. These men, Larsen and Halfinner, commenced sluicing in October and kept it up continuously with day and night shifts by heating the water used in the sluice boxes.

Arizona

Cochise County

Copper Queen—The smeltery at Douglas produced 8,927,203 lb. of copper in February, of which 1,760,351 lb. was from custom ores.

Gila County

Cactus—The underground work is being advanced in seven faces, including drifts, crosscuts and raises. The drifts are being driven west from the Hamilton shaft to connect with the Pinto shaft on the third and fourth levels, and the connection should be made in about two weeks. The churn drill ordered for prospecting the schist area will be set at work several hundred feet north of the Hamilton shaft as soon as it arrives at the mine. W. H. Hamilton is in immediate charge and is employing 100 men.

Inspiration—About 3000 ft. of drifting and raising have been completed on and above the 400-ft. level of the Joe Bush shaft. This footage is being increased by about 900 ft. monthly. Development is being continued in nine faces of the Joe Bush workings, and three raises put up east and west of the shaft to verify the results of the churn-drill work have so far shown that the grade of ore indicated by the drill holes was two-tenths lower than that of the material taken out in underground driving. The crosscut driven south from the Scorpion shaft on the 275-ft. level is 360 ft. long and is continuing in ore. Much of the ore will be removed from the mine through the Keystone adit when extraction by the milling method is begun. Eventually, a main working shaft will be sunk about 1000 ft. outside the orebody and 1300 ft. south of the Joe Bush shaft. Manager T. R. Drummond is employing about 170 men.

Superior & Boston—The installation of a 1000-gal. Prescott pump is completed at the sixth level. Two 250-h.p. Stirling boilers are being set in their concrete foundations. Two carloads of 9 per cent. copper ore from the sixth level are being sent to the Old Dominion smeltery every day. J. D. Wanvig, superintendent, employs 100 men.

Arizona Commercial—The smeltery is treating about 210 tons of 6 per cent. ore daily from the fifth and sixth levels of the company's mine. The pumps are raising about 3,000,000 gal. per day.

Old Dominion—A contract for sinking a 400-ft. double-compartment shaft on the Transit claim of the United Globe group, adjoining the Old Dominion group, has been let to W. E. Carter, of Globe. After this depth has been reached, the ground will be worked by lease. The smeltery is receiving 675 tons of ore daily. The levels below the 10th are receiving the greater part of the work in the mine, and the smelting ore is taken from the lower levels. G. H. Dowell is manager.

Superior & Globe—Crosscuts northeast and southwest from the 500-ft. level of the Superior & Globe shaft are 180 ft. long. The work continues in diabase. The new 60-h.p. hoist is now in use, the old one having been removed. A force of 25 men is employed. H. V. Snell, of Globe, is superintendent.

Arizona-Michigan — The north and south crosscuts on the 500-ft. level of the Telfair shaft are 490 and 455 ft. long. Northward, the work continues in quartzite; southward, in diorite. Although no definite arrangement has yet been made concerning the date for the commencement of sinking a second shaft, this work will probably be started soon. This shaft will be near the outcrop of the Old Dominion vein, about 1000 ft. south of the Telfair shaft. At the present time 20 men are employed. N. A. Nelson is superintendent.

Graham County

Detroit—This company at Morenci produced 1,486,400 lb. copper in February.

Arizona Copper Company—February production was 2,658,000 lb. copper.

Yavapai County

Mildred—This company is installing a 10-stamp mill on its St. Elmo group. D. B. Genung, Stanton, is superintendent.

Alvarado—This mine at Congress Junction is equipped to handle 150 tons of ore per day and has temporarily discontinued operations pending the electrification of its plant. E. W. Durfee is manager.

Weaver Mountain Mining Company—This company, a reorganization of the Rincon Mining Company, states that operations will soon be resumed.

California

Amador County

South Eureka—This mine is using its own forty stamps and 20 stamps of the Central Eureka. Its own mill is to be increased to 60 stamps.

Calaveras County

Fox—Dredging operations on the Calaveras river have been started. The work is done by two machines, one to dig and the other to wash the gravel.

Pilot—This mine at Cave City, near Mountain Ranch, is being opened. It was a producer in early days.

Kern County

Mohave—Near Mohave, in the Soledad region, the Queen Esther mine is working 120 men and hauling 150 tons of ore daily. The Double Standard has 40 miners employed. The Karma-Ajax and Echo group will soon employ 80 men. The Exposed Treasure will shortly start up. Water is piped 18 miles to these mines.

Nevada County

Nassau—O. O. Howard, president of this company, operating the old Dana mine in Grass Valley district, says they have come near the works of the old Eureka, and will crosscut for the vein known to exist.

Pittsburg—In reopening this mine, Manager Mark B. Kerr has reached the 1100 level. All the underground machinery has been overhauled and repaired or replaced.

Jenny Lind—A trial run of 200 tons of gravel is being made. It is supposed that the real gravel channel has at last been struck.

Murchie—This Nevada City property, which has been idle a year, is now to be started up by a new company.

PLACER COUNTY

Dewey—C. H. Young, superintendent of this property near Butcher ranch, will soon set three shifts of miners at work. Free-gold ore has been found while running the tunnel.

SHASTA COUNTY

Trinity Copper—The Shasta King mines of this company, west of Kennett, are expected to start up shortly.

Black Tom—The litigation against this company has been settled, the owners promising that claims will be paid before May 2.

SIERRA COUNTY

Sailor Ravine—At this place, near Downieville, Jason Frye has struck a pocket mine from which he has taken $15,000 in specimens in a short time.

TUOLUMNE COUNTY

Republican—A new company has put this mine in operation under T. F. McGovern. The mine will be unwatered at once.

Erie—This company, owning the Grizly, Dead Horse, Lady Washington and New Albany mines, has paid off its indebtedness and operations will shortly be resumed.

Phoenix Lake—This company is putting up a 5-stamp mill on the Maddox & McPherson mine, near Confidence.

Colorado

LAKE COUNTY—LEADVILLE

The Arkansas Valley smeltery has four out of its eight furnaces in blast. Leadville alone is unable to keep even this number going, and a good deal of ore is brought in from the outside. Except for the operations of the Iron Silver Company, most of the work at Leadville is being done by lessees and tributers. The New Jersey Zinc Company is making plans to reopen the Colonel Sellers mine. This mine has the largest reserve of zinc ore that now exists in the Leadville district. The zinc orebodies of all of the other mines have been greatly depleted, and Leadville is now on the wane as a producer of zinc.

Blanche—In the above mine, under lease to George Campion, a 30-ft. vein of good ore is just reported as having been struck at 185 ft. depth. It is a lead sulphide carrying gold and silver.

TELLER COUNTY

Gold Sovereign—A new orebody at 1100 ft. is reported. The width of the richest portion of the 14-in. vein is four inches, and said to run $900 per ton. The lessees are the Clements Leasing Company.

Jennie Sample—Ten blocks of this mine are under lease to Van Tilburg & Cobb, and at present the work is confined to development.

Golden Cycle—Wilson, Beebe & Pettit, leasing on a portion of the Golden Cycle, shipped 900 tons in February, said to average $18 in gold per ton.

Gold Dollar and Mabel M.—During February the ten sets of lessees on these properties sent out 35 carloads of ore said to average about one ounce gold per ton. The shaft is down 600 ft., but probably will not be deepened until the drainage tunnel unwaters these Beacon Hill mines.

Acacia—The North and South Burns and Morning Star claims, on Bull hill, belonging to this company, are credited with three discoveries of good ore. On the North Burns, leased by Bunch & McNamee, two cars of ore shipped without sorting yielded $21.80 per ton. On the South Burns, under lease, C. N. Crowder, manager, six inches of 4-oz. gold ore is reported. On the Morning Star a shoot of $15 mill ore has been opened. The output of the Acacia company in the past is given at $800,000, with $198,000 paid in dividends.

Standard Tunnel—This tunnel, the first to unwater the Beacon hill section many years ago, is being operated again.

Ajax—The Ajax produced 35 cars of medium-grade ore during February. The mine is worked by 25 sets of leasers, 75 miners all told being at work.

Mohican—This mine on Battle mountain, leased by Arthur Carnduff, is said to have a foot of ore which runs $100 per ton in gold. Three feet of the vein produces screenings of good medium grade. About 20 tons per day are being broken.

Gold King—This mine, about the first big producer in the Cripple Creek district, now under lease to the former superintendent, Sam Macdonald, is said to be shipping a carload of 4-oz. ore per week. There are 12 sets of lessees on this mine.

SAN JUAN COUNTY

From Silverton it is reported that the San Juan county shipments for the month of February were 250 tons of crude ore and 2775 tons concentrates. In the Sneffels district above Ouray an important strike of 18 to 36 in. of gold ore is reported at a depth of 900 ft., and 4000 ft. from the portal of the tunnel. The ore is a gray copper carrying a high percentage of silver, but free gold has now made its appearance in the gray copper.

Tomboy—In February 9200 tons of ore were crushed, yielding $44,000 in bullion and $25,000 in concentrates. Working expenses were $43,000.

Idaho

COEUR D'ALENE DISTRICT

Hypotheek—Claiming mismanagement of the property, the Moosejaw, Canada, stockholders who own 500,000 shares, are endeavoring to gain enough proxies to control the annual meeting, at which time they expect to make a change in the officials.

Charles Dickens—Three feet of high-grade galena has been opened in the bottom of a 100-ft. winze and at a distance of several hundred feet from where the exposed orebody lies. The new strike will be developed.

Black Bear Fraction—A raise from the 1200 level has opened two feet of shipping lead-silver ore.

Cedar Creek—A snowslide carried away the compressor building and machinery, resulting in a delay in operations which will extend until warm weather.

Caledonia—During February the mine shipped $35,000 worth of ore and in January $30,000. This month the company intends to increase the amount to $40,000.

Reindeer—The crosscut of the ledge has cut a diabase dike which is believed to be the wall of the vein. Drifting along this dike has commenced, every foot showing shipping copper ore. Much shipping and milling copper ore is blocked out. A mill is to be erected this spring.

Hercules—A slide carried away the blacksmith shop and equipment and a portion of the tramway at the No. 4 tunnel, causing $5000 damage.

Idaho Giant and Bitter Root Mountain—George Huston, of Mullan, has taken 15-year leases on both properties.

Hector—A contract for a 3000-ft. crosscut to cut all three ledges has been let.

Indiana

CLAY COUNTY

The fact that the big block-coal companies have worked out their mines near Brazil is by no means discouraging. The operators have moved further from the city and have begun to develop new mines. The Schrepferman Coal Company has purchased 300 acres of block-coal land a few miles south of the city, that has a vein 4 ft. 10 in. thick. The company is arranging to put down two shafts on this land; it is also just completing a new shaft south of Hadleytown, where it has 50 acres of good coal land.

GIBSON COUNTY

Renewed activity is apparent throughout the Oakland City oilfield. Scores of new wells are being drilled and those completed during the past week proved

good producers. The February figures for this field show a gain over the January report; 36 wells were completed.

GRANT COUNTY

The Domestic Block Coal Company, G. W. Frederick general manager, with headquarters in Kokomo, Ind., is planning to invest $350,000 in coal mining. The company is organized under the laws of Arizona but Indiana men are back of the enterprise.

Michigan

COPPER

Ojibway—A new compressor has been received and as soon as it is ready to go into commission additional drills will be added and sinking resumed in both shafts. Drifting from the 500- and 650-ft. levels of these shafts continues in a good grade of stamp rock, as also the drift from the 800-ft. level of No. 2. Drifting from this point at No. 1 shaft has been discontinued after being extended for a considerable distance in baren ground, passing out of the copper-bearing portion of the lode due to faulting. The drift from No. 2 will be continued to ascertain the course of the vein.

Copper Range—The boiler plant of the Baltic mill was practically destroyed by fire, March 6. Production from the mine will be taken care of by the Champion and Trimountain mills, each of which had two heads not in operation so that there will be no falling off in production while this plant is being repaired.

Gratiot—This subsidiary company of the Calumet & Hecla will soon enter the production list. Rock shipments are to be made to the Allouez-Centennial mill, the 5th head of which will soon be ready to go into commission. The rock will be taken from the stock pile which has accumulated during the opening of the shafts.

Indiana—Further results from the drilling outfits are being awaited with much interest. No. 6 hole is now sinking in the ledge after passing through about 140 ft. of overburden, and No. 5 hole is down about 270 ft. in a conglomerate formation. It is estimated that these holes will reach the Indiana lode at a depth of between 600 and 700 ft. There are two other outfits working on the tract.

Wolverine—An exploratory crosscut has started eastward from the 28th level to expose the various lodes paralleling the Kearsarge lode. The distance from this point to the eastern boundary of the tract is over 2500 feet.

Lake Superior Development Company—This company has recently been formed with the following officers: President, Joseph Croze, Houghton; treasurer, Joseph Seldon, Calumet; secretary, Clyde S. MacKenzie, Houghton. The tract comprises about 400 acres east of the Gratiot property. A contract for drill work has been let and operations will be started at once.

IRON—MARQUETTE RANGE

West Republic—The Cambria Steel Company, which has leased this mine for some time, has now purchased it from the Wright Iron Company, of Toledo, Ohio.

IRON—MENOMINEE RANGE

Florence—Preparations are being made to ship this year, and 4000 tons of ore per day are being hoisted. About 170 men are employed, most of them on development.

Munro—The shart is now down 150 ft., and crosscuts have been run over 200 ft. on the lowest level. The mine, which is near Norway and is owned by the Buffalo & Susquehanna Iron Company, will be a large shipper this year.

Missouri

JOPLIN ZINC-LEAD DISTRICT

Oronogo Circle—The big surplus pile of zinc ore, containing about 1700 tons, was sold to the Granby Mining and Smelting company, and the ore is being hauled to the cars at the rate of 150 tons a day.

Montana

BUTTE DISTRICT

British Butte—It has been decided not to mortgage the property as originally intended. The dredge and machinery will be sold to the London creditors of the company for an amount which would cover about half of the total indebtedness. It is possible that operations may be resumed.

Butte & Ballaklava—The new electric hoist good for 3000 ft. has arrived and is being put in place. It will be driven by a 350-h.p. motor. The management expects production to average 500 tons daily when the hoist is put in commission.

FERGUS COUNTY

Barnes King—A motion to terminate operations and distribute the money in the treasury among stockholders was voted down. No definite line of action was decided upon with reference to the purchase of new property but it was decided to continue operations on the property now owned by the company. The financial report shows that the company has $259,308 cash on hand and that the operating profit was $13,992 in 1909.

JEFFERSON COUNTY

Corbin Metal Mining Company—The shaft is now down 350 ft. and will be sunk to the 700-ft. mark. Extensive development work will be done on the 500-ft level.

Mt. Thompson—The company plans to build a 50-stamp mill on its property north of Basin. The claims have been opened up by a tunnel 847 ft. in length. At a distance 600 ft. from the portal the management states that the Gray Eagle-Comet lead was intersected, showing a vein 14 ft. wide.

LEWIS & CLARK COUNTY

Montana Mining—All the property of the company was sold at auction by the United States Marshall to satisfy a judgment for $205,000 in favor of the St. Louis Mining and Milling Company. The St. Louis Company bid in the property for $150,000. The Montana company has a year from the date of sale within which to redeem the ground.

MISSOULA COUNTY

Iron Mountain—A dividend of 9c. per share has recently been declared, the result of the sale by the company of the old Iron Mountain mine, a lease and bond on which was recently taken up by the Iron Mountain Tunnel Company for $50,000. The company still owns the War Eagle mine which it proposes to sell and then go out of existence.

French Bar Gold—A complete new equipment is to be installed including a 300-ton mill, the machinery to be in operation by August 1. Enough ore is blocked out to keep the mill running for a year and the orebody is 9 ft. in width.

Nevada

ESMERALDA COUNTY—GOLDFIELD

Florence—At the annual meeting the old officers, headed by T. G. Lockhart, of Goldfield, were reelected. A dividend of 10c. per share, payable in April, was declared. The mill is treating 170 tons per day.

Gold Bar—The Gray lease has started regular shipments, most of the ore coming from the 200-ft. level. The leasing company has just been incorporated as "The Copper-Gold Mines Company" and will erect a 50-ton concentrating plant.

Grizzly Bear—The shaft has reached the 1025-ft. level. At 1150 lateral workings will be started.

NYE COUNTY

Tonopah Mining—The total development work for the week ended March 1 amounted to 505 ft., most of this being in the Silver Top workings. The mill report shows 3150 tons of ore treated, average value $20, extraction 91 per cent. Concentrates worth $10,800, and $43,200 in bullion were shipped.

Belmont—Further development on the 1100-ft. level shows the persistence of the rich vein recently discovered. The ratio of gold to silver is about 1:2.

Montana Tonopah—After driving continuously 1400 ft. in rhyolite, the lode porphyry, or earlier andesite, has been encountered at a point about 2700 ft. from the main shaft.

West End—Heavier and more powerful machinery about to be installed forecasts increased activity underground.

Tonopah Extension—The second bullion shipment from the new mill amounted to $6000. It is planned to increase the present capacity, 120 tons, by using coarser screens and putting another tube mill in commission. J. P. Montague is superintendent.

Thanksgiving—A 5-ft. vein of sulphide ore is reported at a depth of 450 ft. Shortly after the strike a large amount of water came into the shaft and the pumps are now raising 24,000 gal. daily.

WHITE PINE COUNTY—ELY

Giroux Consolidated—Laying of steel is in progress on the side tracks from the Nevada Northern main line to the Giroux shaft. Seven cars of 60-lb. rails have been received to date. The new shaft, which is 12x19½ ft., is now being timbered with the regular shaft timbers, instead of the square sets originally used in the raise. The work of retimbering is progressing at the rate of two sets per day, and will be finished before May 1. Sinking is also in progress below the 1000-ft. level, the dirt being taken out through the old Alpha shaft.

Nevada Consolidated—The copper production of the Steptoe smeltery in February aggregated about 5,000,000 lb. This compares with 3,800,000 lb. in January and 5,700,000 in December. The smeltery is receiving its entire supply of ore from the steam-shovel pit at Copper Flat. The output runs from 100 to 120 sixty-ton cars per day. The ore is being loaded by two shovels, while three are engaged in removing overburden. The steam-shovel pit at present covers an area of about 30 acres, with a maximum depth of 185 ft. Work has been started grading north of the mouth of the pit for ore tracks, which will facilitate extraction below the present bottom of the pit. It appears that a portion of the surface of the recently acquired Cumberland Ely property will be used for the storage of overburden, and tracks are now being laid from the pit for that purpose.

Oklahoma

Alabama—This mine on the Catholic forty at Quapaw is to be put into operation during the present month. This is one of the shallow mines, as sheet lead was found at 36 ft. from the surface.

Oregon

BAKER COUNTY

Climax—Development work is being pushed on this property under the direction of W. H. Jackson, superintendent.

Morning—H. E. Downey, manager, is considering the installation of a milling plant.

JOSEPHINE COUNTY

A shipment of 300 lb. of ore is to be made jointly by the American Mining and Milling Company, Frank Johnson and the Nutt Brothers to Swansea to ascertain the content of platinum and tin.

Oriole—This company will install new mining and milling machinery during the present year. J. C. Mattison, Galice, is manager.

Pennsylvania

ANTHRACITE COAL

Lehigh & Wilkes-Barre Coal Company—This company has arranged to make an issue of $20,000,000 in 4 per cent. bonds, for the purpose of retiring all its outstanding issues.

Philadelphia & Reading Coal and Iron Company—This company's financial statement for the seven months of its fiscal year from July 1 to Jan. 31 gives total receipts of $19,580,239; expenses, $18,782,695; net earnings, $797,544. This shows decreases, as compared with last year, of $725,415 in gross and $377,759 in net earnings.

BITUMINOUS COAL

Miners in the Irwin field in Westmoreland county struck on March 10, about 3000 going out. The strike was caused by the discharge of 75 men at the Keystone and other mines, who were officials of the local unions, or were active in their organization. The Irwin district has always been nonunion, but has recently been organized by delegates from the United Mine Workers. It is claimed that the strike will extend, as a large number of miners have joined the union.

A large block of coal lands in Gilmore township, Greene county, has been sold by H. Newcomer to Pittsburg people, who intend to open a mine. The block includes 1100 acres on the Pittsburg vein, and the price was $135 per acre.

A syndicate headed by Daniel B. Zimmerman, of Somerset, has secured a tract of 1600 acres of coal land north of Somerset, and is making arrangements to open a mine.

H. C. Frick Coke Company—It is reported that the coke plants in the Morgan valley, which have not been in use for some time, will be repaired and put in order; and that large coal bins will be built to hold coal brought from the mines. The plants are situated along the railroad between Owensdale and Broad Ford.

Utah

BEAVER COUNTY

Frisco Consolidated—Active mining operations will be begun at this property by March 14 and development work will be continued.

Gold Crown—Ore which is said to average $104 per ton has been struck in new workings. The shaft is down 130 ft. and a drift has been run about 40 ft., which opened the ore. The property is in the Star district.

IRON COUNTY

Gold Springs Mining and Power Company—Two carloads of machinery for the new power plant have arrived at Modena and more material is in shipment. The power house is ready for the installation of the machinery, which will begin in a few days.

JUAB COUNTY

Tintic ore shipments in carloads for the week ended March 4 were as followss Opohongo, 1; Grand Central, 5; Mammoth, 2; Scranton, 4; Bullion Beck, 4; Eureka Hill, 4; Eagle & Blue Bell, 6; Centennial-Eureka, 43; Yankee, 2; Uncle Sam, 2; East Tintic Development, 1; Chief Consolidated, 3; Gemini, 3; Colorado, 19; Sioux, 12; Iron Blossom, 18; Dragon Iron, 22; May Day (concentrates), 1; total, 152.

Centennial-Eureka—The connection between the tunnel and shaft was made March 1. The tunnel is 2160 ft. long, and connects with the shaft at the 535-ft. level. The tunnel will effect a saving in hoisting ore and pumping water, and in hauling supplies up the hill.

SALT LAKE COUNTY

Utah Copper Company—In 1909 this company sold 51,749,233 lb. of copper for $6,683,321, averaging 12.915c. per lb.; 20,862 oz. of gold, netting $417,247; and 198,943 oz. silver, at 51.528c., netting $102,511.

Cardiff—A raise has been driven about 18 ft. on the strike recently made. The ore has widened from 15 in. to 3 ft.; it carries copper and silver.

SUMMIT COUNTY

Park City ore shipments for the week ended March 5 were as follows: Daly West, 1,230,000 lb.; Silver King Coalition, 1,179,940; Daly-Judge, 645,000; Daly-Judge (zinc), 790,430; Little Bell, 201,000; total, 4,046,370 pounds.

Daly-Judge—The new electrical equipment of the mine will be ready for operation in a few days. A large amount of development work is being done.

Thor—Two feet of carbonate ore have been opened in a crosscut from the upper tunnel of this mine near the head of Big Cottonwood cañon. Mr. Carpenter is superintendent.

Little Bell Consolidated—During February the Little Bell made four shipments aggregating 1,249,210 lb. These shipments averaged 22.43 per cent. lead, 79.8 oz. silver, 0.048 oz. gold, and 2.46 per cent. copper. The net smelter returns on these shipments amounted to $30,773. In addition to this, a fifth shipment of 308,680 lb. is in transit on which returns have

not been received. The total production for February, including this last shipment, will be in the neighborhood of $38,000.

West Virginia

It is reported that arrangements are nearly completed for the combination of a number of mines in the New River district. The mines, it is said, will be represented by a single selling agency, which will handle all their output. The principal companies included are the Chesapeake & Ohio Coal and Coke Company, the New River Consolidated Coal and Coke Company, C. G. Blake Coal and Coke Company, Smokeless Fuel Company, White Oak Coal Company, New River-Kanawha Fuel Company and the New River Coal Company. These companies are able together to mine about 8,000,000 tons yearly.

Canada

British Columbia

Copeland Mining and Development—This Rossland company has arranged for a two-year extension of its bond on the LeRoi.

Silver Cup—A 9-ft. galena vein has been struck on this Hazleton property, which was recently bonded to Prince Rupert people.

British Columbia Copper—This company will in a short time begin the enlargement of its smeltery at Phœnix.

Ontario

Frontenac—The new company which will operate this mine has been incorporated as the North American Smelting Company, Ltd., as the name Canadian Smelting Company conflicted with other organizations.

Ontario-Cobalt

The shipments from Cobalt for the week ended March 4 were as follows: Nipissing, 456,433 lb.; La Rose, 303,312; O'Brien, 129,900; Peterson Lake, 120,850; Crown Reserve, 146,034; McKinley-Darragh, 63,063; Right-of-Way, 62,643; Buffalo, 56,619; Coniagas, 51,600; Cobalt Central, 40,900; Temiskaming, 60,000; Millerette (Blackburn) Gowganda, 60,150; total, 1,551,504 pounds.

Provincial—No. 2 shaft will be sunk to develop a vein cut by the diamond drill. This mine was formerly owned by the government.

Badger—The main shaft will be sunk to a depth of 400 feet.

Rochester—A rich surface vein has been cut at 50 ft. depth and shows several inches of high-grade ore.

La Rose—High-grade ore has been opened up at the 135-ft. level of the Princess. This is the best ore yet found at this mine.

Buffalo—The president states that for the million ounces produced last year, three millions were put in sight. Six months' supply of mill rock is broken in the mine.

Hargraves—This property has nearly a car of high-grade ore on hand besides two cars of low-grade.

Mexico

Baja California

Boleo—The February production was 1058 metric tons of copper from ores containing an average of 3.468 per cent.

Chihuahua

Socorro—This company has renewed mine operations, but will not operate its reduction works for the present.

Grand Central—An important lead-silver body has lately been opened up in this mine in the Sabinal district, and ore shipments to the El Paso smeltery are in progress. Edward Selverson is superintendent.

Mexican Quicksilver Company—A cinnabar deposit is being developed by this company in the vicinity of Saucillo. John R. Roslyn is in charge.

Guanajuato

Production—Ores, concentrates and bullion worth 1,055,000 pesos were shipped from the Guanajuato district in February. Shipments during the first week of March were 275,000 pesos, an increase over previous weeks, this year, due to the resumption of high-grade shipments by the Pinguico Mines Company.

Cubo—As soon as an aërial tram, now under construction, is completed, shipments of low-grade ore to the Peregrina plant will commence. Shipments will consist principally of mine fillings.

Nueva Luz—The deep shaft is now down 520 m. (over 1700 ft.) and will be sunk to the 1000-m. level, when laterals will be driven. This is the shaft on which the Mexican government pays a subsidy of 150 pesos per meter below the 500-m. level.

Jalisco

Virginia & Mexico—The weekly production now ranges from 8000 to 10,000 pesos. Difficulties at the reduction plant are being overcome and it is expected to double the output within a short time.

El Mirador—The Orito, Orito Anexas Nos. 1 and 2, Providencia and Mercedes claims on extensions of the Solomon and El Favor veins in the Hostotipaquillo district have been purchased by the El Mirador Mining Company, of New York, organized several months ago to develop the Mirador-San Francisco group in Tepic. Shipping ore was recently encountered in the Providencia.

Amparo—The receiving station of the Chapala Hydroëlectric and Irrigation Company, at the Amparo properties, is completed, and the transmission line is within a few miles of it. Current is expected in June. The Amparo will take 700 h.p. at a rate of 100 pesos per h.p. per year, and will save more than one-half in power costs.

Mexico

El Oro—In February the output was $211,130 in bullion from 24,699 tons of ore. Working expenses were $98,970 and $25,400 were spent on development. A total profit of $93,760 was made inclusive of railway earnings.

Mexico Mines—February crushing was 10,650 tons, yielding $113,760 bullion. Working expenses were $40,350 and $11,500 was spent on development.

Sonora

Greene-Cananea—A telephone line is being installed from Cananea to Naco, Arizona.

Sierra Pinta—This company in the Altar district has drawn plans for a cyanide plant. A 5-stamp mill is running steadily.

Moctezuma-Arizpe—A resumption of exploration work will be made April 1. About 25 men will be put to work.

Africa

Transvaal

Gold production of the Transvaal in February is reported at 575,622 oz. fine, a decrease of 25,746 oz. from January. For the two months ended Feb. 28 the total was 1,180,331 oz. in 1909 and 1,176,990 oz. or $24,328,383 in 1910; a decrease of 3341 oz. this year. The February production was the smallest reported in any month for a year past.

Asia

Korea

Oriental Consolidated—Mail advices give the following figures for January: Crushed 27,738 tons; gross receipts, $126,664; operating costs, $69,029; improvements, $1571; net profit, $56,063.

Australia

Western Australia

Gold production in February was 111,035 oz. For the two months ended Feb. 28, it was 255,403 oz. in 1909, and 238,386 oz.—or $4,927,438—in 1910; a decrease of 17,017 oz. this year.

New Zealand

Gold exports in February were 36,848 oz. For the two months ended Feb. 28, the total was 77,230 oz. bullion in 1909, and 77,527 oz. in 1910; an increase of 297 oz. The bullion reported this year was equal to $1,500,087, or 72,574 oz. fine gold. Silver exports for the two months were 198,678 oz. in 1909, and 299,896 oz. in 1910; an increase of 101,218 oz. this year.

$ · THE MARKETS · $

CURRENT PRICES OF METAL · MINERALS · COAL AND STOCKS · CONDITIONS AND COMMERCIAL STATISTICS

Coal Trade Review

New York, March 16—The bituminous-coal trade in the East is quiet and rather inclined to be dull. The anthracite trade is without incident.

In the West, of course, the wage-scale settlement is the general topic of discussion. The Cincinnati conference has come to nothing, the wage-scale committee having failed to agree and presented no report. The miners continue firm in their demand for an advance and the operators equally firm in their refusal to make concessions. No date has been set for another conference, and the general opinion is that their will be a strike on April 1. The question is more fully discussed on our editorial page.

Coke Rates—On complaint of the Lackwanna Steel Company and others, the United States Circuit Court at Buffalo, N. Y., has enjoined the Pennsylvania, the New York Central, the Erie and other roads from putting into effect the proposed new rates on coke from the Connellsville district to Buffalo, until they have been submitted to the Interstate Commerce Commission. The complaint charged that the new rates would constitute a discrimination against Buffalo, in favor of Pittsburg, Gary and other points.

Coal Traffic Notes

Anthracite shipments in February were 5,031,784 tons, being 272,834 tons less than in January. For the two months ended Feb. 28 the shipments were, in long tons:

	1909.	1910.	Changes.
Reading	1,982,656	2,254,596	I. 271,940
Lehigh Valley	1,642,908	1,724,779	I. 81,871
N. J. Central	1,204,980	1,247,849	I. 42,869
Lackawanna	1,357,001	1,604,578	I. 247,577
Del. & Hudson	1,037,869	973,672	D. 64,197
Pennsylvania	859,088	1,020,089	I. 161,001
Erie	1,214,583	1,106,739	D. 107,844
N. Y., Ont. & West.	460,264	406,100	D. 54,164
Total	9,759,349	10,338,402	I. 579,053

Total increase this year, 5.9 per cent. Five companies reported increases this year; three—the Delaware & Hudson, the Erie and the New York, Ontario & Western—had decreases.

New York

Anthracite

March 16—The anthracite trade is without incident. February production showed an increase over last year.

Schedule prices for large sizes are $4.75 for lump and $5 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes quotations are, f.o.b. New York harbor points, according to grade: Pea, $3@3.25; buckwheat, $2.35@2.50; No. 2 buckwheat or rice, $1.75@2; barley, $1.35@1.50. The lower prices are generally for washery coal.

Bituminous

The seaboard bituminous trade is dull, so far as present sales are concerned. Consumers seem to be pretty well stocked up and are rather reluctant to take on more coal at present. The contract season is now on and a great deal of discussion is forward. Consumers seem to want the lower-priced coals and are slow about closing for the better grades. So far as anything has been done prices are moderate. Georges Creek is bringing about $1.50@1.60 at mines; good Miller vein steam is closed for at $1.40@1.50 at mines, and some of the poorer grades of steam coal can be had down to $1.10 at mines. Gas coal has been quoted at $1@1.10 at mines for ¾-in. and $1 for run-of-mine, while the lower grades have sold at 95c. for ¾-in. at mine.

Car supply is a little better than it has been, but is still poor. Transportation has improved, but there are still occasional delays.

There is some discussion of the Western situation going on. A strike is expected, but the general belief is that it will not last long and will have little effect on the seaboard trade.

The coastwise trade is quiet and rates are a little irregular but are settling down to a spring basis.

Birmingham

March 14—The demand for coal requires steady operation at the coal mines in Alabama. The railroads are beginning to relieve the situation by adding more locomotive power, this having been the greatest drawback. There have been no changes in coal prices recently. Orders booked in the past few months and others in sight give promise of a steady operation of the coal mines through the summer.

A complaint was filed recently with the Interstate Commerce Commission by the Alabama Coal Operators' Association that the railroad rates on coal from this State to Georgia, South Carolina, Florida and other points were higher than from the mines in Tennessee. The operators assert that the higher rates caused some difference in the production in this State last year.

Chicago

March 14—Under the influence of mild weather and an apparently settled conviction of the retailer and consumer that there will be no scarcity of coal because of labor troubles, the market has become rather dull. All coals are in good supply, and the feature of the market which has distinguished it from the spring market of previous years, the high price of screenings from Illinois and Indiana mines, continues. At present screenings bring as much or a little more than run-of-mine coal, and they have brought nearly as much for more than a month. The use of coal for steam purposes is heavy, but many plants have accumulated stocks which they will draw upon for use rather than buy largely. Domestic coals show light buying everywhere, with the anthracite trade reduced to a low total because of the approach of April discounts.

Illinois and Indiana lump brings $2.20 @2.50; run-of-mine $2@2.15; and screenings $2@2.25, in car-lots. Eastern coals continue in good demand, but smokeless is still in too large supply, with run-of-mine at $3.20@3.30 and lump at $3.55@3.65. Hocking is in good demand and well regulated to the needs, with consequent firmness of price at $3.15. Contract making, now beginning, shows about the same prices as last year.

Cleveland

March 14—Domestic trade is falling off, but steam coal is active. Some large plants are stocking up against a possible suspension. An early opening of the Lake trade is expected and boats are loading up.

Quotations show little or no change from last week, except for Youghiogheny, which is now quoted, f.o.b. Cleveland, at $2.40 for 1¼-in., $2.25 for ¾-in., $2.15 for run-of-mine and $1.85 for slack.

Indianapolis

March 14—Work in the coalfields of Indiana, including the block-coal district, has gradually become quiet. The coal men give it as their opinion that the cause is the unsettled mining conditions growing out of the scale trouble. The demand for six weeks past has been unprecedented and the producing companies have been having a strenuous time to fill their orders. The railroads and factories have now stored all they can handle.

If the advance of 10c. a ton is made in

the price of mining after April 1, it is reported that the coal-carrying railroads have agreed to advance the freight rate 10c. also. This means that the operators will sell the coal at the mine, the purchaser paying the freight.

Pittsburg

March 15—Current opinion undoubtedly leans more toward expecting a suspension of mining than at any previous time. There is heavy inquiry for coal for stocking purposes, but the regular shippers have their hands full already with their regular trade and are not in position to take care of much extra demand. Car supply is not as good this week. Rather fancy prices are quoted for prompt coal, up to $1.25 for slack and $1.25 or higher for mine-run, the regular quotations being nominal. There has been a heavy business done in the renewal of annual contracts in the past fortnight, at slight advances over rates in expiring contracts. Nominally coal prices are unchanged, at $1.15 for mine-run and nut, $1.25 for ¾-in., $1.40 for domestic 1¼-in. and $1@1.05 for slack.

Connellsville Coke—A sale of 3000 tons of furnace coke for March and April delivery has been made at $2.15, and another sale of 8000 tons for same delivery at $2.10. We quote prompt and near-by furnace coke at $2@2.25, and contract at $2.25. Foundry coke is selling in a limited way at $2.65@2.75 per ton.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ended March 5 at 467,311 tons, an increase of over 5000 tons, and shipments at 4861 cars to Pittsburg, 8627 cars to points west of Pittsburg and 886 cars to points east of Connellsville, a total of 14,374 cars.

St. Louis

March 14—There has been a temporary lull in the market for the past week owing to the weather, which has been unusually mild for even this time of the year. Prices, however, have not suffered to amount to anything and today there is a decided improvement as the joint meetings of the operators and miners at both Chicago and Cincinnati have adjourned without reaching any agreement.

The demand for coal has been very strong from steam plants and railways who had been storing coal very heavily for the past three weeks. The railroads are by far the heaviest buyers and are still absorbing coal. The larger industries are also taking a great deal of coal. The smaller plants, however, have not as yet started to store coal.

The market for anthracite is very soft today and the few cars which have been in transit lately have been sold at a sacrifice. On the whole, the anthracite market this year has been satisfactory and the tonnage larger than any preceding year, though the price war of the larger dealers during the first part of the season made a big hole in profits.

Current prices are as follows:

Standard:	F.o.b. Mine.	F.o.b. St. Louis.
6-in. lump	$2.00	$2.52
2-in. lump	1.70	2.22
Mine-run	1.60	2.12
2-in. nut	1.50	2.02
2-in. screenings	1.10	1.62
Pea and slack	0.80	1.32
Staunton, Mt. Olive & Springfield:		
6-in. lump	2.00	2.52
3-in. lump	1.75	2.27
Mine-run	1.25	1.77
2-in. nut	1.10	1.02
2" screenings	1.25	1.77
Carterville:		
6-in. lump or egg	2.10	2.77
3-in. nut	1.80	2.47
Mine-run	1.50	2.17
1½-in. screenings	1.10	1.77
Franklin County:		
6-in. lump or egg	2.20	2.87
3-in. nut	2.00	2.67
2-in. nut	1.50	2.17
1½-in. screenings	1.20	1.87
Trenton:		
6-in. lump	2.50	3.02
6-in. egg	2.25	2.77
3-in. nut	1.75	2.27
Pennsylvania Anthracite:		
Nut, stove and egg		6.95
Grate		6.70
Arkansas Anthracite:		
Egg or grate	3.35	5.35
Coke:		
Connellsville foundry	2.50	5.30
Gas house		4.40
Smithing coal	1.65	4.15

FOREIGN·COAL·TRADE

United States Coal Exports—Exports of coal and coke from the United States, month of January, long tons:

	1909.	1910.	Changes.
Anthracite	165,092	215,313	I. 50,221
Bituminous	549,090	511,939	D. 37,151
Total coal	714,182	727,252	I. 13,070
Coke	74,481	70,768	D. 3,713

Canada took this year 448,013 tons of coal, or 61.7 per cent. of the total. The coke went chiefly to Mexico and Canada. Cuba took 78,909 tons of coal.

United States Coal Imports—Imports of coal and coke into the United States, month of January, long tons:

	1909.	1910.	Changes.
Anthracite	3,103	.....	D. 3,103
Bituminous	99,109	141,478	I. 42,369
Total coal	102,212	141,478	I. 39,266
Coke	13,028	13,501	I. 473

Canada furnished this year 115,056 tons of coal and nearly all the coke; Australia, 13,865 tons coal; Japan, 10,935 tons coal. Imports are chiefly on the Pacific Coast and in the northwestern States.

Nova Scotia Coal—Coal shipments from Nova Scotia mines, month of January, long tons:

Companies.	1909.	1910.	Changes.
Dominion	120,130	182,411	I. 62,281
Nova Scotia Steel	38,845	45,342	I. 6,397
Acadia	24,852	23,534	D. 1,318
Intercolonial	9,918	20,298	I. 10,380
Inverness	19,767	19,684	D. 87
Total	213,512	291,269	I. 77,757

The total increase this year was 36.4 per cent.

IRON·TRADE·REVIEW

New York, March 16—The iron and steel trades still continue to hold something of the waiting position and business has hardly come up to the expectations which were expressed last month.

In pig iron there has been more or less inquiry for basic and foundry, but buyers are asking concessions on third-quarter iron which furnaces are hardly yet prepared to accept. In the Central West only moderate sales are reported. In eastern territory there has been some call for foundry but no heavy transactions. There is still some speculative Southern iron which is offered at low prices and the market will be unsettled until this is all out of the way.

In finished material the railroads have been the chief buyers either directly or through the car companies with which they have placed very heavy orders. In structural steel there is some buying and a good deal of negotiation which has not yet come to a head. Outside of this the market is not active.

Pig-iron Production—The reports of the furnaces, as collected by the *Iron Age*, show that on March 1 there were 311 coke and anthracite furnaces in blast, having a total weekly capacity of 594,000 tons; an increase of 7500 tons over Feb. 1. Making allowance for the charcoal furnaces, the total production of pig iron in February was 2,432,500 tons; for the two months ended Feb. 28 it was 5,076,500 tons. Of this total 3,393,500 tons were made by the steelworks furnaces.

Baltimore

March 14—Imports during the week included 922 tons ferromanganese from Liverpool; 5512 tons cupreous pyrites from Spain; 10,800 tons iron ore from Cuba.

Birmingham

March 14—Southern pig-iron market shows very little change. The demand is far from being brisk but the make is still quite healthy and shipments almost as good as the make, the local consumption caring for the balance, so that there is no accumulation. The furnace companies are still quoting $14 per ton, No. 2 foundry. There is warrant and resale iron still to be obtained from 50 to 75c. below that price. The officials of the furnace companies express confidence of a recovery in the market before long. Inquiries for pig iron for delivery during the last half of the year are coming in, but very few sales are being reported. The buying for the third and fourth quarters of the year is looked for usually during the latter part of April or May. As long as there is no extensive accumulation of iron the furnace officials say there is no need for alarm. Orders in

hand will require a large tonnage of iron yet.

Basic and charcoal iron continue to meet with favor and the make is being about cared for. The blowing in of Eagle furnace at Attalla, Ala., adds about 60 tons of charcoal iron to the daily make.

The Southern Railway Company has ordered 42,000 tons of rails, which will be rolled at the Ensley mills.

Chicago

March 14—Indications in the iron market are of greater strength, though the tangible evidences of improvement are slight. Buying of pig iron continues to be in small lots generally. Present and prospective needs are large. No weakness on the part of furnace agents seems to be developing. They hold to $13 Birmingham ($17.35 Chicago), as a minimum price on Southern. Northern is firm and quiet at $18.50, while much Southern iron is sold at $13.50 Birmingham. For last-half deliveries business and inquiries are steadily increasing. Lake Superior charcoal iron brings $19 and is firm.

Iron and steel products are firmer, with sales in general good, and railroad sales increasing. Coke is in fair demand and good supply at $5.75, Chicago.

Cleveland

March 14—No sales of iron ore are reported.

Pig Iron—Sales have been chiefly of small lots. There are large inquiries, but no heavy business has been closed. Furnaces are inclined to cut prices to secure orders. Quotations are, Cleveland delivery, $18.75@18.90 for bessemer; $17@17.25 for No. 2 foundry.

Finished Materials—Railroads and car-builders are the principal buyers just now. Bar iron is a little more in demand. Inquiries are in for steel bars.

Philadelphia

March 16—The pig-iron market is dull, not from lessened consumption, but from an indisposition to purchase in large lots at the present time. Makers are full of the notion of continuing strong prices, while buyers are as full of the notion that prices will weaken. Basic iron has gained in strength, owing to influences in other markets. Prices have advanced nominally, at least 25 or 50c. per ton. No. 2 foundry is weak, because of few orders. Southern foundry is being offered cheap. Forge iron is dull. No. 2 X is quoted at $18.50; best gray forge, $17.50; while $18.50@18.75 is asked for basic.

Scrap—A demand has set in which will clean up many of the yards who have been carrying heavy melting and No. 1 scrap through the winter. Dealers say there is a good deal of scrap to be had through their territory, and they are now on the war path to gather it in.

Pittsburg

March 15—Improving conditions in the steel trade are widely reported, but are supported more by reiteration than by the citation of concrete facts.

Plates and shapes for Eastern delivery are $1 a ton lower than at the beginning of the year, being 1.50c. Pittsburg, while for local and Western delivery they remain at 1.55c. Steel bars on contract are 1.45c., but 1.50c., is obtained for prompt shipment.

Pig Iron—The greatest event in the local market for several weeks was the placing of 15,000 tons of foundry iron by the Westinghouse Electric and Manufacturing Company, 5000 tons for its Allegheny works, in Pittsburg, and 10,000 tons for its Cleveland works, all for equal deliveries over the second half. The Allegheny tonnage went at $16.50, delivered, divided between the only merchant furnace in Allegheny county, which had a 35c. rate to the works, and the only furnace in Fayette county, which has an 85c. rate. The Cleveland business was divided between two of the three Cleveland furnace interests, at $16.75, delivered, the switching charge being not over 35c. As to costs of production, the Cleveland iron should have brought less than the Pittsburg iron, but it appears that there was an understanding on $16.75 by the producers. The trade was rather shocked at the price done on the Pittsburg iron. While the Valley furnaces did not sell, the business shows what they would have to do to get into Pittsburg; and if they cannot get into Pittsburg there is not much left for them. The equivalent Valley price is $15.60, whereas the market had been quoted at $16.25 for early delivery, and the talk was that inasmuch as ore is 50c. higher this season, and will come into use about June, second-half iron ought to be $1 higher than prompt iron. Nominally the prompt market is quotable 25c. lower, at $16, Valley, or $16.90, Pittsburg, but there has really been nothing done to make a market. Basic is still quotable at $16, Valley, some furnaces offering to sell at this price. There have been several transactions in basic, amounting to nearly 10,000 tons, but none of them have been straight sales. In last report a straight sale of 10,000 tons of bessemer to the Cambria Steel Company was reported at $17.50, Valley. It has developed that the business went through a Pittsburg merchant firm, which presumably received a commission, but the price paid by the consumer was nominally $18 at furnace, with an allowance of three months' interest, making the net price to consumer about $17.72. A sale of 7000 tons was made to the Lackawanna Steel Company by another seller on the same terms. The market is constructively quotable at $17.75, Valley, for last week and this.

Steel—The market for billets continues quiet, shipments being heavy however, on old contracts. Prices remain quotable at $27@27.50 for bessemer billets, $27.50 @28 for open-hearth billets, $28.50@29 for sheet-bars and $33 for rods, all f.o.b. maker's mill, Pittsburg or Youngstown districts.

Sheets—There is no change, demand being good for sheets except classes of material, which depend upon outdoor work for consumption. Prices remain at 2.40c. for black, 3.50c. for galvanized, $1.70 for painted corrugated roofing and $3 for galvanized corrugated, with blue annealed sheets nominally 1.75c., but practically 1.90c. for early delivery. Corrugated sheets are being shaded $1 a ton.

METAL MARKETS

New York, March 16—The metal markets continue rather quiet, with few changes in price or conditions.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
Jan. 1910..	$ 6,163,132	$ 2,131,357	Exp. $ 4,031,775
" 1909..	7,865,356	3,420,183	" 4,545,173
Year 1910..	6,163,132	2,131,357	" 4,031,775
" 1909..	7,865,356	3,420,183	" 4,445,173
Silver:			
Jan. 1910..	4,498,304	4,248,354	Exp. 249,950
" 1909..	4,542,094	3,664,752	" 877,342
Year 1910..	4,498,304	4,248,354	" 249,950
" 1909..	4,542,094	3,664,752	" 877,342

Exports from the port of New York, week ended March 12: Gold, $730,010, to Cuba and South America; silver, $449,000, to London and Paris. Imports: Gold, $137,530, from Central and South America; silver, $70,780, from Mexico and Central America.

Transvaal gold production for the two months ended Feb. 28 was $24,328,383, a decrease of $69,058 from last year.

Gold—No special demand appeared this week and prices on the open market in London continued steady at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. No exports from New York are reported.

Platinum—Business is good and the market is firmer owing to reports from abroad. Dealers are now asking $29@ 29.50 per oz. for refined platinum, and $35 per oz. for hard metal.

Our special correspondent writes from St. Petersburg, Russia, under date of Feb. 17, that business has improved. At Ekaterinburg the small dealers ask 6 rubles per zolotnik—equal to $22.56 per oz.—for crude metal, 83 per cent. platinum. In St. Petersburg the market is strong, and crude metal cannot be had under 24,000 rubles per pood—equal to $23.52 per oz. Even this price is subject to negotiation, higher figures being named.

Silver—The market has been steady, advancing from 23 7/16 to 23 ¾d. in London on buying for Chinese banks and Indian bazaars. The effect of the increased duty in India is gradually being worked out and the price is adjusting itself to the new conditions.

SILVER AND STERLING EXCHANGE

Mar.	10	11	12	14	15	16
New York....	50⅞	51⅛	51⅛	51⅛	51⅜	51½
London.....	22 7/16	23⅜	23 1/16	23⅜	23 1/16	23¾
Sterling Ex..	4.8690	4.8680	4.8680	4.8695	4.8705	4.8700

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Copper, Tin, Lead and Zinc

Mar.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
10	13½ @13¾	13¼ @13½	59⅝	32½	4.50 @4.52½	4.35 @4.37½	5.55 @5.60
11	13½ @13¾	13¼ @13⅜	58 1/8	32⅜	4.47½ @4.52½	4.32½ @4.37½	5.52½ @5.57½
12	13½ @13¾	13¼ @13⅜	....	32¼	4.47½ @4.52½	4.32½ @4.37½	5.52½ @5.55
14	13½ @13⅝	13⅜ @13⅝	59¼	31⅝	4.45 @4.50	4.30 @4.32½	5.50 @5.52½
15	13½ @13⅝	13⅜ @13⅝	58 1/8	31¾	4.45 @4.50	4.30 @4.32½	5.50 @5.52½
16	13½ @13⅝	13⅜ @13⅝	58⅞	31¾	4.45 @4.50	4.30 @4.32½	5.50 @5.52½

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—The statistics published on March 10, acted as a damper on the enthusiasm of the previous week, although it is hard to see why they should have been received so pessimistically. The London market declined sharply, making it impossible to take export orders in competition with electrolytic ex-European warehouses. The few orders which offered in this market were eagerly competed for, and the inducements offered by sellers through a decided concession from their previous prices failed to attract a larger business. The market closes easy at 13½@13⅝c. for Lake copper, which is largely nominal, and 13⅛@13⅜c. for electrolytic copper in cakes, wirebars and ingots. Casting copper is quoted nominally at 13@13⅛ as the average for the week.

Copper sheets are 19@20c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14¾c. base, carload lots at mill.

Transactions in the London standard market were conducted on a lower scale of values, and the publication of the statistics on March 16, showing a decrease in the visible supply abroad of 600 tons, has so far not helped the market, the close being cabled easy at practically the bottom prices, £58 17s. 6d. for spot and £59 17s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £62; best selected, £62@£62 10s.; strong sheets, £71@£72 per ton.

The outside speculation in copper in the London market, emanating from this side, which has been a factor during the last two years, is now practically at an end, and but few of the old accounts remain. It will be remembered that this speculation was stimulated by one or more brokerage houses, whose participation in the copper business is chiefly through our own stock markets. Speaking generally, the speculative accounts in the London market for standard copper have been unprofitable.

In the suit of the United Metals Selling Company vs. the American Smelting and Refining Company, by decision of the Supreme Court of New York, Edward Brush of the defendant company must stand examination. The plaintiff in this case charges breach of contract and asks damages of $1,000,000. The defendant makes a counterclaim for $814,699. This case arises from contract for the sale of copper. In 1901 the Smelting company entered into contract with the Metals company for the latter to act as sole selling agent for a commission of 1 per cent. In 1903 it was agreed that settlement should be made weekly on the basis of JOURNAL quotations. In February, 1907, the contract was modified to the effect that the Smelting company should estimate its production for the third month ahead, settlement being made on this estimate. Thus, settlement for March would be for copper to be delivered in the following May. If actual production exceeded the estimate settlement for the surplus was to be made at the quotational average for the month of actual delivery. The Metals company claims that from May to October, 1907, the Smelting company violated the contract by delivering more than its regular product, which resulted in large loss to the Metals company owing to the great decline in the market during that period.

Copper Producers' Association—The report for February gives the following figures for the month and the two months ended Feb. 28, in pounds:

	February.	Two Months.
Stocks, Feb. 1 and Jan. 1	98,463,339	141,766,111
U. S. production.....	112,712,493	229,259,780
Total supplies.....	211,175,832	371,025,891
Deliveries, domestic....	66,618,322	144,776,709
Deliveries for export ...	37,369,518	119,061,190
Total deliveries.....	103,987,840	263,837,899
Stocks, Mar. 1.....	107,187,992	107,187,992
Inc. or dec. in stocks..	I. 8,724,653	D.34,578,119

Tin—The London market has experienced a considerable decline during the period under review. It was partly ascribed to the weaker copper market, which also had an unsettling influence on tin, and partly to heavy sales by the bull syndicate. The latter seems the more plausible reason, as the transactions on the London Metal Exchange during the decline were exceptionally large. The close is cabled as easy at £143 15s. for spot and £145 15s. for three months.

Business in the domestic market was more active at the lower level when consumers took hold more liberally than for some time past. Prices followed closely the fluctuation in London, and closed at about 31¾c. per pound.

Lead—The product of the independent Missouri concerns continues to be pressed for sale. The American Smelting and Refining Company, presumably in recognition of the situation, published a reduction in its schedule on March 15, of 10c. per 100 lb. on desilverized, which, however, was practically followed by an almost equal concession in the quotations of the outsiders. The market closes weak at 4.45@4.50c. New York, and 4.30 @4.32½c. St. Louis, and the market seems to be demoralized.

The London market is unchanged at £13 3s. 9d. for Spanish lead, and £13 6s. 3d. for English lead.

Spelter—Business has been rather light and as the supplies of ore from the West are coming forward in increased volume, the market has again given away, and closes easy at 5.65@5.67½c. New York, and 5.50 @5.52½c. St. Louis.

New York quotations for spelter, March 10, were 5.70@5.75 c.; March 11, 5.67½ @5.72½c.; March 12, 5.67½@5.70c.; March 14-16 inclusive, 5.65@5.67½ cents.

The London market is also somewhat lower at £23 for good ordinaries and £23 5s. for specials.

The property of the Lanyon Zinc Company will be sold at sheriff's sale, April 11, at 10 a.m., at the court house at Iola, Kan. Acting for bondholders, the Trust Company of America, New York, obtained a judgment for about $2,225,000 against the company and an order of foreclosure.

Other Metals

Aluminum—Business is good, and prices have a stronger tendency. Quotations current are 23@23½c. for ingots, and a further advance is possible, in view of the growing demand. In Europe the market is strong and advancing, producers being unwilling to contract far ahead.

Quicksilver—A moderate business is doing, but prices are easier. The New York quotation is $49 per flask of 75 lb.; jobbers ask 73@74c. per lb. for small lots. San Francisco, $48@49 for do-

mestic orders and $2 less for export. The London price has been reduced to £9 5s. per flask, with £9 2s. 6d. asked by jobbers.

Antimony—The market is rather dull, and prices are unchanged. Cookson's is selling at 8¼@8½c., and U. S. at 7⅞@8c.; while 7¼@7⅜c. is asked for outside brands.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots, up to 55c. for 200-lb. lots. The price for electrolytic is 5c. higher.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots f.o.b. New York.

Cadmium—Current quotations are 65@70c. per lb. in 100-lb. lots at Cleveland, Ohio. Prices in Germany have been advanced and are now 500@550 marks per 100 kg.—average 56.7c. per lb.—f.o.b. works in Silesia.

Zinc and Lead Ore Markets

Colorado Zinc Ore—Zinc ore at Leadville is being bought upon the basis of the zinc content, less eight units, at the St. Louis price of spelter, less $17.50 for freight and treatment. On this basis, ore assaying 40 per cent. zinc fetches about $17.70 when spelter is at 5½c. St. Louis.

The silver-lead smelters in Colorado are experiencing a pronounced shortage of silicious ore, and consequently are making concessions in rates. The zinc limit, which used to be 10 per cent., has been raised to 13, and even to 15 per cent.

Platteville, Wis., March 12—The base price paid this week for 60 per cent. zinc ore was $44@45 per ton. No sales of lead ore are reported; offerings declined to $52 per ton of 80 per cent. lead.

SHIPMENTS, WEEK ENDED MAR. 12.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Mineral Point	714,000	.....	.....
Platteville	517,880	.....	244,400
Benton	251,950	.....	.....
Highland	182,700	.....	.....
Cuba City	170,375	.....	.....
Harker	84,590	.....	.....
Galena	48,700	.....	.....
Linden	.....	.....	50,000
Total	1,970,195	.....	294,400
Year to date	14,950,385	1,099,099	2,545,950

In addition to the above there was shipped during the week to the separating plants, 1,350,505 lb. zinc ore.

Joplin, Mo., March 12—The highest price reported paid for zinc sulphide ore was $49, the base price for the best grades being $44@46 per ton of 60 per cent. zinc, though some ore heavy in iron, is reported sold on a $47 base. Zinc silicate ore sold on a base of $21@24 per ton of 40 per cent. zinc, with the high price at $29. The average price, all grades, was $39.82 per ton. The highest price offered for lead ore this week was $53 per ton, for ores carrying 80 per cent. lead. The average price, all grades, was $52.55 per ton.

A sale of 1600 tons of stock at Oronogo was made this week at a price neither the buyer nor seller will make public. It is reported that no sale of ore was made, but that it is to be smelted by the Granby company on a fixed charge, the spelter to belong to the ore-producing company. No verification of this could be made.

SHIPMENTS, WEEK ENDED MAR. 12.

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	4,473,760	689,040	$109,897
Joplin	1,693,060	208,970	45,272
Duenweg	867,140	25,170	17,888
Alba-Neck	804,480	16,830	17,732
Galena	710,160	77,740	15,988
Badger	691,610	.....	14,869
Granby	870,000	1,700	12,875
Spurgeon	433,180	110,030	9,568
Quapaw	407,010	23,790	8,961
Carthage	385,320	.....	8,284
Miami	468,450	49,120	6,676
Oronogo	212,460	68,190	6,523
Jackson	265,940	.....	5,451
Aurora	296,940	.....	4,043
Cave Springs	124,150	.....	2,545
Sarcoxie	107,110	.....	1,789
Carl Junction	74,430	.....	1,500
Totals	12,885,200	1,270,580	$289,861
11 weeks	113,695,740	18,026,610	$2,883,314

Zinc value, the week, $256,478; 11 weeks, $2,382,618
Lead value, the week, 33,383; 11 weeks, 500,696

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$41.25	$47.31	$38.46	$45.16	$52.17	$56.99
February	36.94	40.69	34.37	39.47	50.50	53.64
March	37.40	.....	34.71	.....	50.82	.....
April	38.63	.....	37.01	.....	55.63	.....
May	40.06	.....	37.42	.....	56.59	.....
June	44.15	.....	40.35	.....	57.52	.....
July	43.06	.....	41.11	.....	53.74	.....
August	48.25	.....	44.54	.....	57.60	.....
September	47.70	.....	44.87	.....	56.11	.....
October	49.50	.....	45.75	.....	55.02	.....
November	51.31	.....	48.29	.....	53.94	.....
December	49.45	.....	47.57	.....	55.26	.....
Year	$43.98	.....	$41.20	.....	$54.60	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

CHEMICALS

New York, March 16—The general market continues steady with some disposition to improve in various directions.

Copper Sulphate—A good business is reported and the market is steady with rather a strong tone. Prices are unchanged at $4.10 per 100 lb. for carload lots and $4.35 per 100 lb. for smaller orders.

Arsenic—The market is very dull. In the absence of sales quotations continue nominal at $2.50@2.62½ per 100 lb. for white arsenic.

Nitrate of Soda—Business continues on a large scale and sales are active. Spot nitrate has advanced a little and is now quoted at 2.12½c. per lb. On the other hand, futures have weakened to 2.07½c. per lb. in view of large imports and the heavy shipments reported afloat.

MINING·STOCKS $

New York, March 16—The general stock market was rather weak at first, but grew a little firmer toward the close, Steel Corporation issues being especially strong. It has been, however, distinctly an inside market, in which the general public seems to be taking little interest.

On the Curb, trading followed the course of the Stock Exchange. The copper stocks generally were at first weak, but toward the close recovered a little and several of the more prominent issues showed some strength. Outside of the coppers, trading was inclined to be dull. Cobalt stocks making the best showing.

A sale of 500 shares of United Verde Copper Company at $70 per share at public auction was reported March 9. Also 10,000 shares of San Luis Mining Company at $1040 for the lot, and 1000 shares of Tenabo Mining and Smelting Company at $320 for the lot.

Boston, March 15—The report of the Copper Producers' Association gave the market a chill, from which it has not recovered. Prominent has been a sharp decline in Arizona Commercial shares, which carried the price off almost $8 to low of $32.50. North Butte, after touching $44.25, fell back to $41, but with no undue selling pressure. Superior & Boston recorded a sudden burst of activity, which took the price up to $16.50, an advance of $3; subsequently, it reacted to $14.50. Less activity has been witnessed in the new Lake coppers. Mass mining has been more or less of a feature, and recorded a $2.37½ advance to $7.37½ on the levying of a $2 assessment. New blood has come into the directorate, members of a prominent local brokerage house.

Amalgamated has had a $7.12½ break during the week, to $76.62½. Franklin and La Salle, after strong and active periods, also lost their buoyancy.

Assessments

Company.	Delinq.	Sale.	Amt.
Alpha Con., Nev	Mar. 12	Apr. 7	$0.05
Bader, Cal	Feb. 24	Mar. 14	0.10
Belcher, Nev	Mar. 9	Mar. 29	0.10
Cardiff, Utah	Mar. 10	Mar. 28	0.00½
Central Eureka, Nev	Mar. 13	Apr. 23	0.02½
Challar, Nev	Mar. 8	Mar. 31	0.10
Confidence, Nev	Mar. 25	Apr. 15	0.20
Crown Point, Nev	Mar. 8	Mar. 28	0.10
Gould & Curry, Nev	Mar. 14	Apr. 6	0.10
Hale & Norcross, Nev	Mar. 9	Mar. 31	0.10
Mexican, Nev	Feb. 21	Mar. 17	0.15
New Arcadian, Mich	Mar. 10	.....	1.00
Ojibway, Mich	Mr.Oct.	.....	2.00
Oneco, Mich	Feb. 15	.....	1.00
Overman, Nev	Apr. 6	Apr. 27	0.10
Potosi, Nev	Apr. 5	Apr. 28	0.10
Seg. Belcher, Nev	Mar. 8	Mar. 28	0.10
Seven Troughs Mon., Utah	Mar. 12	Apr. 2	0 00½
Sierra Nevada, Nev	Apr. 7	Apr. 27	0.10
South Columbus, Utah	Mar. 30	Apr. 30	0.02
Union, Nev	Mar. 7	Mar. 31	0.10
Yellow Jacket, Nev	Mar. 7	Apr. 11	0.10

Boston Ely and Rhode Island Coal have both been strong Curb features. National Exploration took quite a break, but has since recovered. The time for exchanging bonds into stock has been extended.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
III, 1909	117,058,661	48,871,964	59,191,043
IV	113,574,292	47,546,010	65,110,111
V	118,356,146	61,163,325	70,542,753
VI	116,567,493	60,591,116	70,966,457
VII	118,277,603	75,520,083	75,018,974
VIII	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Year	1,405,403,056	705,051,591	680,942,620
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518

VISIBLE STOCKS.

	United States.	Europe.	Total.
III, 1909	173,284,248	117,140,800	290,425,048
IV	182,279,902	115,024,000	297,303,902
V	183,198,073	114,050,320	297,248,393
VI	169,848,141	127,352,960	297,201,101
VII	154,858,061	150,928,960	305,787,021
VIII	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	.....	23.227	.....
April	51.428	.....	23.708	.....
May	52.905	.....	24.343	.....
June	52..38	.....	24.166	.....
July	51.043	.....	23.519	.....
August	51.125	.....	23.588	.....
September	51.440	.....	23.743	.....
October	50.923	.....	23.502	.....
November	50.703	.....	23.351	.....
December	52.226	.....	24.030	.....
Total	51.502	.....	23.726	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER

	NEW YORK.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	.....	12.826	.....	56.231	.....
April	12.56¼	.....	12.93¾	.....	57.363	.....
May	12.893	.....	13.238	.....	59.338	.....
June	13.214	.....	13.548	.....	59.627	.....
July	12.880	.....	13.363	.....	58.556	.....
August	13.007	.....	13.296	.....	59.393	.....
September	12.870	.....	13.210	.....	59.021	.....
October	12.700	.....	13.030	.....	57.551	.....
November	13.125	.....	13.354	.....	58.917	.....
December	13.298	.....	13.647	.....	59.906	.....
Year	12.982	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	27.380	32.700	July	29.207	.....
February	28.978	32.920	August	29.942	.....
March	30.577	.....	September	28.815	.....
April	31.702	.....	October	29.444	.....
May	30.015	.....	November	30.348	.....
June	28.024	.....	December	29.154	.....
			Av. Year	29.465	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	.....	3.835	.....	13.438	.....
April	4.168	.....	4.051	.....	13.297	.....
May	4.287	.....	4.214	.....	13.225	.....
June	4.350	.....	4.291	.....	13.031	.....
July	4.321	.....	4.188	.....	12.563	.....
August	4.363	.....	4.227	.....	12.475	.....
September	4.342	.....	4.215	.....	12.781	.....
October	4.341	.....	4.215	.....	13.175	.....
November	4.370	.....	4.252	.....	13.047	.....
December	4.560	.....	4.459	.....	13.125	.....
Year	4.273	.....	4.153	.....	13.049	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.991	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.563	23.188
March	4.757	.....	4.607	.....	21.438	.....
April	4.965	.....	4.815	.....	21.531	.....
May	5.124	.....	4.974	.....	21.975	.....
June	5.402	.....	5.252	.....	22.000	.....
July	5.402	.....	5.252	.....	21.969	.....
August	5.729	.....	5.579	.....	22.125	.....
September	5.796	.....	5.646	.....	22.906	.....
October	6.199	.....	6.043	.....	23.200	.....
November	6.381	.....	6.231	.....	23.188	.....
December	6.249	.....	6.099	.....	23.094	.....
Year	5.503	.....	5.352	.....	22.201	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.98	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	.....	15.84	.....	15.62	.....
April	15.79	.....	15.05	.....	15.06	.....
May	15.77	.....	15.02	.....	15.08	.....
June	16.13	.....	15.84	.....	15.63	.....
July	16.40	.....	15.90	.....	15.96	.....
August	17.16	.....	16.17	.....	16.20	.....
September	18.44	.....	16.80	.....	17.03	.....
October	19.75	.....	17.84	.....	18.02	.....
November	19.90	.....	18.37	.....	18.09	.....
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS Mar. 15

Name of Comp.	Bid.
Listed:	
Acacia	.06
Cripple Cr'k Con.	.02⅞
C. K. & N.	.10
Doctor Jack Pot.	.07¼
Elkton Con.	.68
El Paso	.66
Fannie Rawlins.	.05
Findlay	.09¾
Gold Dollar	.10
Gold Sovereign	.04
Isabella	.17½
Mary McKinney	.46⅝
Pharmacist	.03
Portland	1.06½
Vindicator	.79½
Work	.05¼
Unlisted:	
Golden Cycle	1.40
United Gold Mines	.08

SALT LAKE Mar. 15

Name of Comp.	Clg.
Carisa	.60
Colorado Mining	.77
Columbus Con.	.49
Daly Judge	3.50
Grand Central	1.62½
Iron Blossom	.94
Little Bell	1.70
Little Chief	.45
Lower Mammoth	.50
Mason Valley	1.82½
Maj. Mines	2.32½
May Day	.19½
Nevada Hills	.52
New York	‡.13
Prince Con	.75
Red Warrior	6.00
Silver King Coal'n	2.50
Sioux Con	.38
Uncle Sam	.39
Victoria	‡1.05

SAN FRANCISCO. Mar. 15.

Name of Comp.	Clg.
COMSTOCK STOCKS	
Atlanta	.15
Belcher	1.30
Best & Belcher	‡.75
Caledonia	.69
Challenge Con.	.30
Chollar	.30
Confidence	1.02
Con. Cal. & Va.	1.25
Crown Point	1.25
Exchequer	.35
Gould & Curry	.32
Hale & Norcross.	.49
Mexican	1.57
Ophir	1.47
Overman	1.17
Potosi	.54
Savage	.37
Sierra Nevada	.58
Union	.76
Yellow Jacket	1.20
MISC. NEVADA	
Belmont	2.30
Daisy	.06
Jim Butler	.12
MacNamara	.27
Midway	.31
North Star	.02
West End Con.	.40
Atlanta	.15
Booth	.16
C.O.D. Con.	.09
Columbia Mt.	.06
Comb. Frac.	.34
Great Bend	.03
Jumbo Extension	.37
Oro	.07
Red Hill	.04
Sandstorm	.03
Silver Pick	.09
St. Ives	.20
Tramps Con.	.04

N. Y. EXCH. Mar. 15

Name of Comp.	Clg.
Amalgamated	77⅜
Am. Agri. Chem.	45½
Am.Sm.&Ref.,com	85⅝
Am. Sm. & Ref., pf.	108
Anaconda	49
Bethlehem Steel.	31
Col. & Hock. C. & I.	15
Colo. Fuel & Iron.	39⅝
Du Pont P'd'r, pf.	‡85
Federal M. & S.	53½
Great Nor., ore ctf.	69
Nat'nalLead,com.	83¼
National Lead, pf.	‡109½
Pittsburg Coal.	21
RepublicI&S,com.	39½
Republic I & S, pf.	103
SlossSheffi'd,com.	78
Sloss Sheffield, pf.	117½
Tennessee Copper	33
Utah Copper	49¼
U. S. Steel, com.	85¼
U. S. Steel, pf.	121½
Va. Car. Chem.	57

N. Y. CURB Mar. 15

Name of Comp.	Clg.
Bonanza Creek	3
Boston Copper	19¼
Braden Copper	5⅛
B. C. Copper	6⅞
Buffalo Mines	3½
Butte Coalition	25½
Chino Copper	14½
Cobalt Central	.18
Combination Fra.	.34
Con. Ariz. Sm.	2¾
Cumberland Ely.	‡9
Davis-Daly	3½
Dominion Cop.	7
Ely Con	13/16
El Rayo	2 1/16
Florence	3⅛
Gila Copper	8⅛
Giroux	9¼
Gold Hill	1½
Goldfield Con.	8⅝
Greene Cananea.	10⅝
Guanajuato	1⅝
Guggen. Exp.	215
Kerr Lake	.08 1/16
La Rose	4 11/16
McKinley-Dar-Sa.	.95
Miami Copper	23⅞
Mines Co. of Am.	50
Montezu. of C. R.	2½
Mont. Shoshone	7/8
Mont.-Tonopah	.70
Nev. Utah M. & S.	1¼
Newhouse M. & S.	‡3½
Nipissing Mines.	10¼
Ohio Copper	4⅜
Pacific Sm. & M.	7/8
Silver Queen	.20
Standard Oil	645
Stewart	½
Tonopah	7⅜
Tonopah Ex.	.76
Tri-Bullion	15/16
Utah Apex	5⅛
W. Va. Wyo. Cop.	2⅛
Yukon Gold	4½

LONDON Mar. 16

Name of Com.	Clg.
Dolores	£1 8s 3d
Stratton'sInd.	0 3 3
Camp Bird	1 7 3
Esperanza	2 17 6
Tomboy	0 17 1½
El Oro	1 7 9
Oroville	0 10 0

BOSTON EXCH. Mar. 15

Name of Comp.	Clg.
Adventure	9¼
Allouez	51
Am. Zinc	29
Arcadian	7¼
Arizona Com	33
Atlantic	9½
Boston Con.	19
Calumet & Ariz.	73
Calumet & Hecla.	625
Centennial	21¾
Con. Mercur	.15
Copper Range	76½
Daly-West	9
East Butte	10⅜
Franklin	19¾
Greene-Can.	10¼
Hancock	23
Isle Royal	21
Keweenaw	4¾
La Salle	16⅜
Mass	6⅛
Michigan	7⅛
Mohawk	60½
Nevada	23¼
North Butte	41
Ojibway	10
Old Dominion	42½
Osceola	153
Parrot	18
Quincy	88
Shannon	14½
Superior	55
Superior & Bost.	14¾
Superior & Pitts.	13⅞
Tamarack	70
Trinity	8½
U. S. Smg. & Ref.	46½
U.S.Sm. & Re., pd.	51½
Utah Con.	32
Victoria	4½
Winona	10¾
Wolverine	143
Wyandotte	2½

BOSTON CURB Mar. 15

Name of Comp.	Clg.
Ahmeek	‡210
Bingham Mines.	‡5
Boston Ely	3¾
Calaveras	5½
Champion	.10
Chemung	‡12½
Chief Cons	2 7/16
Chino	14¾
Corbin	10⅛
Cactus	4⅞
Crown Reserve	‡3⅝
First Nat. Cop.	4½
Gila Copper	‡8⅛
Indiana	34½
Inspiration	8 1/16
Majestic	.90
Ray Central	3⅞
Ray Con.	21½
Rawhide Coal.	.29
Rhode Island Coal	11⅜
San Antonio	11½
South Lake	13
Trethewey	‡1⅞
Vulture	9⅝
Yuma	1¼

ST. LOUIS Mar. 12

N. of Com.	High.	Low.
Adams	.35	.30
Am. Nettie	.07	.06
Center Cr'k	1.75	1.40
Cent.C.&C.	82.00	81 00
C.C. & C. pf	84.00	83.00
Cent. Oil	115.00	100.00
Con. Coal	20.00	19.00
Doe Run	105.00	100.00
Gra. Bimet	.30	.28
St. Joe	14.00	12.00

‡Last quotation.